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OREST SERVICE
ICE BULLETIN NC-30

TIMBER IN MISSISSIPPI 1972

BY JOHN S. SPENCER, JR. & BURTON L. ESSEX

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NORTH CENTRAL FOREST EXPERIMENT STATION
FOREST SERVICE
U.S. DEPARTMENT OF AGRICULTURE

THE AUTHORS

John S. Spencer, Jr., is a Resource Analyst at the North Central Station. He earned a Bachelor's degree in forestry at Virginia Polytechnic Institute and a Master's degree at the University of Montana. Spencer served on national forests in Montana and California for 8 years before transferring to Forest Survey at the Intermountain Forest and Range Experiment Station, Ogden, Utah in 1963, then to the North Central Station in 1968.

Burton L. Essex is the Project Leader and Principal Resource Analyst for the Resources Evaluation Research Work Unit at the North Central Station. He received his Bachelor's and Master's degrees from Michigan State University. Essex has been engaged in resources evaluation research since 1955.

North Central Forest Experiment Station
John H. Ohman, Director
Forest Service - U.S. Department of Agriculture
Folwell Avenue
St. Paul, Minnesota 55108

1976

FOREWORD

This report presents Missouri's timber resource in 1972 as found by the third Forest Survey of Missouri. It provides information concerning forest area, timber inventory, growth, mortality, removals, timber products output, future timber supply, and opportunities for forest management. It compares some of these findings with those of the 1959 survey.

Missouri's timber is a resource of primary importance to the State and its economy. In national perspective, the variation in levels of output likely from the State's timber resource will have little effect on nationwide markets except those for charcoal and cooperage. And, because of the predominantly hardwood composition of the State's forests, Missouri timber will play a minor role in helping to solve the Nation's approaching softwood roundwood shortage.

Forest Survey is a continuing endeavor as mandated by the McSweeney-McNary Forest Research Act of 1928. Its objective is to inventory periodically the Nation's forest lands to determine their extent, condition, and volumes of timber, growth, and depletions. This kind of up-to-date information is essential to frame intelligent forest policies and programs. USDA Forest Service regional experiment stations are charged with the responsibility for conducting these inventories and publishing summary reports for individual States. The North Central Forest Experiment Station is responsible for Forest Survey work done in Michigan, Wisconsin, Minnesota, North Dakota, eastern South Dakota, Nebraska, Iowa, Illinois, Indiana, Missouri, and Kansas.

Fieldwork for the 1972 Missouri Forest Survey was started in January 1970 and was completed in May 1973. Reports on the two previous surveys of Missouri's timber resource are dated 1947 and 1959. These earlier reports provide a basis for comparison with the information in this report for those interested in trends that have developed over the past quarter century.

More accurate survey information was obtained during the 1972 survey than otherwise would have been feasible because of intensified field sampling made possible by extra funding provided the North Central Station by the State Legislature through the Missouri Department of Conservation. The Department also canvassed primary wood-using plants in the State, which helped in estimating the quantity of timber products harvested in Missouri.

Personnel from the National Forests in Missouri installed sample plots on national forest lands, which were used to inventory those lands. The USDA Agricultural Stabilization and Conservation Service and the State Historical Society of Missouri furnished aerial photos used in the survey.

Resource Bulletins reporting statistical highlights and detailed tables on the 1972 timber resource of the five Forest Survey Units in Missouri have been published and are available from the North Central Forest Experiment Station or the Missouri Department of Conservation.

The following persons assisted in the Missouri survey:

North Central Forest Experiment Station, Forest Survey Project:

Office Personnel:

Berghild M. Berntsen, Statistical Clerk
Scott T. Berglund, Aerial Photo Technician
James E. Blyth, Market Analyst
Thomas P. Ginnaty, Jr., Timber Removals Compilation Specialist
Jerold T. Hahn, Compilation Supervisor
Ronald L. Hackett, Aerial Photo Interpretor
Catherine L. Hauck, Statistical Assistant
Beverly K. Irving, Statistical Clerk
Patricia A. Krekelberg, Statistical Assistant
Arnold J. Ostrom, Field Crew Coordinator
Alexander Vasilevsky, Aerial Photo Interpretor
Darlene L. Wensaut, Manuscript typist

Field Personnel:

Craig D. Beardsley, Field Supervisor, then
John A. Prochazka, Field Supervisor, then
Kenneth R. McCain, Field Supervisor
Michael W. Ballew
Joseph L. Bondioli
Paul W. Brockmann
John E. Cook
Dale R. DeGroot
David L. Duckett
John T. Eschle
David W. Goller
James H. Johnson
Daniel L. Maijala
Roderick E. Murphy
Kenneth E. Peterein
Daniel L. Seekins
Mark E. Smith

Missouri National Forests Personnel:

Gary Lidholm
Neal Morrison

Missouri Department of Conservation Personnel:

Osal B. Capps, State Forester
John E. Wylie, Assistant State Forester
Robert Massengale, Forest Products Specialist

HIGHLIGHTS

Forest Area

Forest land in Missouri totaled 12.9 million acres in 1972, a decline from the 14.3 million acres in 1959.

Commercial forest land amounted to 12.4 million acres in 1972, down from 13.8 million acres in 1959.

The main reason for the decline was the conversion between surveys of 955 thousand acres of commercial forest to wooded pasture.

Farmers, private individuals, and corporations other than forest industries own 84 percent of the commercial area.

Poletimber stands (40 percent of the commercial forest area) and sawtimber stands (32 percent) dominated the State in 1972. In 1959 the same stand-size classes dominated, with 30 percent and 28 percent of the area, respectively.

Oak forest types cover three-fourths of the commercial area. The black-scarlet oak type was the largest with 4.4 million acres, down from 5.2 million acres in 1959.

Timber Volume

Volume of growing stock on commercial forest land was 6.0 billion cubic feet in 1972, a small gain from the 5.7 billion cubic feet in 1959.

Volume in sawtimber trees totaled 15.1 billion board feet in 1972, up from 13.3 billion board feet in 1959.

Growing-stock volume was highest in the Eastern Ozarks Unit with 37 percent of the total.

Hardwoods, chiefly oaks, account for 94 percent of the growing-stock volume.

Average volume per acre of growing stock in 1972 was 485 cubic feet (6.1 cords) compared to 414 cubic feet (5.2 cords) in 1959.

Volume in nongrowing-stock trees--mostly rough trees--amounts to an additional 3.1 billion cubic feet.

Growing-stock inventory is projected to increase to 6.3 billion cubic feet in 2002 assuming a low level of timber removals, or to remain at 6.0 billion cubic feet assuming a high level of removals.

Stand Characteristics

Net annual growth on growing-stock trees amounted to 177 million cubic feet (3.0 percent of inventory) in 1971.

Mortality of growing-stock trees totaled 13.0 million cubic feet (0.2 percent of inventory) in 1971.

Sixty-one percent of the commercial forest is poorly stocked with growing-stock trees. Only 32 percent of the area is medium stocked or better with growing-stock trees.

Sixty-eight percent of the commercial area is capable of growing trees 50 feet and taller at age 50, but only 17 percent of the area is capable of growing trees 70 feet and taller at the same age.

Stands are less than 50 years old on 58 percent of the commercial area.

Timber Use

There were 681 active, primary, wood-using plants in 1969 in the State, down from 1,161 plants in 1958.

The 1969 output of roundwood products was 124 million cubic feet, compared to 136 million cubic feet in 1958.

The 549 active sawmills in 1969 produced 368 million board feet of lumber, compared with 990 sawmills in 1958 that produced 314 million board feet of lumber.

Missouri charcoal kilns produced 125,000 tons in 1969 and loggers in the State produced 54 million board feet of cooperage logs and bolts in the same year, making Missouri the Nation's leading producer of these products.

Growing-stock removals in 1971 were 168 million cubic feet.

Removals of growing stock are projected to increase to 173 million cubic feet in 2002 assuming a low level of removals, or to reach 197 million cubic feet assuming a high level of removals.

Management Opportunities

Forty-two percent of the commercial area is in good condition and does not need treatment to make adequate volume growth over the next decade.

Thirty-one percent of the area lacks a manageable stand, suggesting stand conversion and/or artificial regeneration.

Sixteen percent of the area is composed of stands whose site index and age indicate they are ready for harvest or will be ready within the next decade.

Eleven percent of the area grows stands that are immature and overstocked, suggesting that intermediate treatment would be desirable.

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NOTE

References to information concerning growth, mortality, and removals are dated 1971, but information concerning forest area and timber inventory incorporate changes that occurred during calendar year 1971; therefore, they represent conditions as of January 1, 1972, and are dated 1972.

Additional copies of the Major Forest Type map for Missouri (inside back cover) are available.

TIMBER IN MISSOURI, 1972

John S. Spencer, Jr., and Burton L. Essex

TIMBER RESOURCE TRENDS

Forest Area Declines

From an estimated 30 million acres of forest land at the time of first settlement, Missouri's forested area totaled 14.3 million acres in 1959[1] and declined further to 12.9 million acres in 1972.

Commercial Forest Area Drops 10 Percent

Commercial forest land, which accounted for 28 percent of the State's total land area in 1972 and which made up the bulk of the forest land during the last two surveys, fell from 13.8 million acres in 1959 to 12.4 million acres in 1972 (fig.1). This converts to an annual rate of loss of commercial forest of 0.8 percent compared to an average of 0.2 percent for the rest of the States in the North-Central Region[2] during the period 1952-1970.[3] This substantial decline in the commercial area base is the result of a number of factors, which are discussed below.

Remeasurement of permanent sample plots during the 1972 survey permitted an estimate of the magnitude and direction of land-use change between surveys. This estimate shows that of the 13,818 thousand acres of commercial forest in 1959 the following changes had occurred by 1972:

Land-use change between 1959 & 1972	*Area* (Thousand acres)
Commercial forest area in 1959	13,818
Conversion to noncommercial forest land:	
Productive-reserved forest land	166
Conversion to nonforest land:	
Wooded pasture	955
Improved pasture	377
Cropland	230
Rights-of-way	85
Urban development	36
Recreation	33
Other nonforest uses	30
Additions to commercial forest:	
Nonforest land (natural reversion to forest)	391
Noncommercial forest land	68
Commercial forest area in 1972	12,365

Conversion to Pasture Major Reason for Area Loss

As seen in the tabulation above, conversion to pasture is the chief cause of the loss of commercial forest area. The estimated 955 thousand acres changed to wooded pasture and 377 thousand acres to improved pasture[4] were converted by application of

[1] *Published 1959 statistics have been adjusted to be comparable with 1972 data because of changed definitions and procedures used during the two surveys. In general, most of the adjustment resulted from application of a more specific definition of wooded pasture in 1972 than was used in 1959. Consequently, a large area classed as commercial forest land in 1959 was classed as wooded pasture (nonforest land) in 1972.*

[2] *Michigan, Wisconsin, Minnesota, North Dakota, eastern South Dakota, Nebraska, Kansas, Iowa, Illinois, and Indiana.*

[3] *From "The Outlook for Timber in the United States," USDA For. Serv., For. Resour. Rep. 20, October 1973.*

[4] *Improved pasture is defined as land developed for grazing domestic livestock and less than 16.7 percent stocked with live trees. Wooded pasture is defined as improved pasture at least 16.7 percent stocked with live trees but less than 25 percent stocked with growing-stock trees (see Appendix for definition of stocking). Wooded pasture is land stocked sufficiently with trees to be classed as forest land but on which the present highest use is forage production for livestock. The latter is determined by the presence of livestock and the performance of grazing improvements. In the future, if the present highest use of such land changes, as evidenced by the removal of livestock, the land would be classed as forest land.*

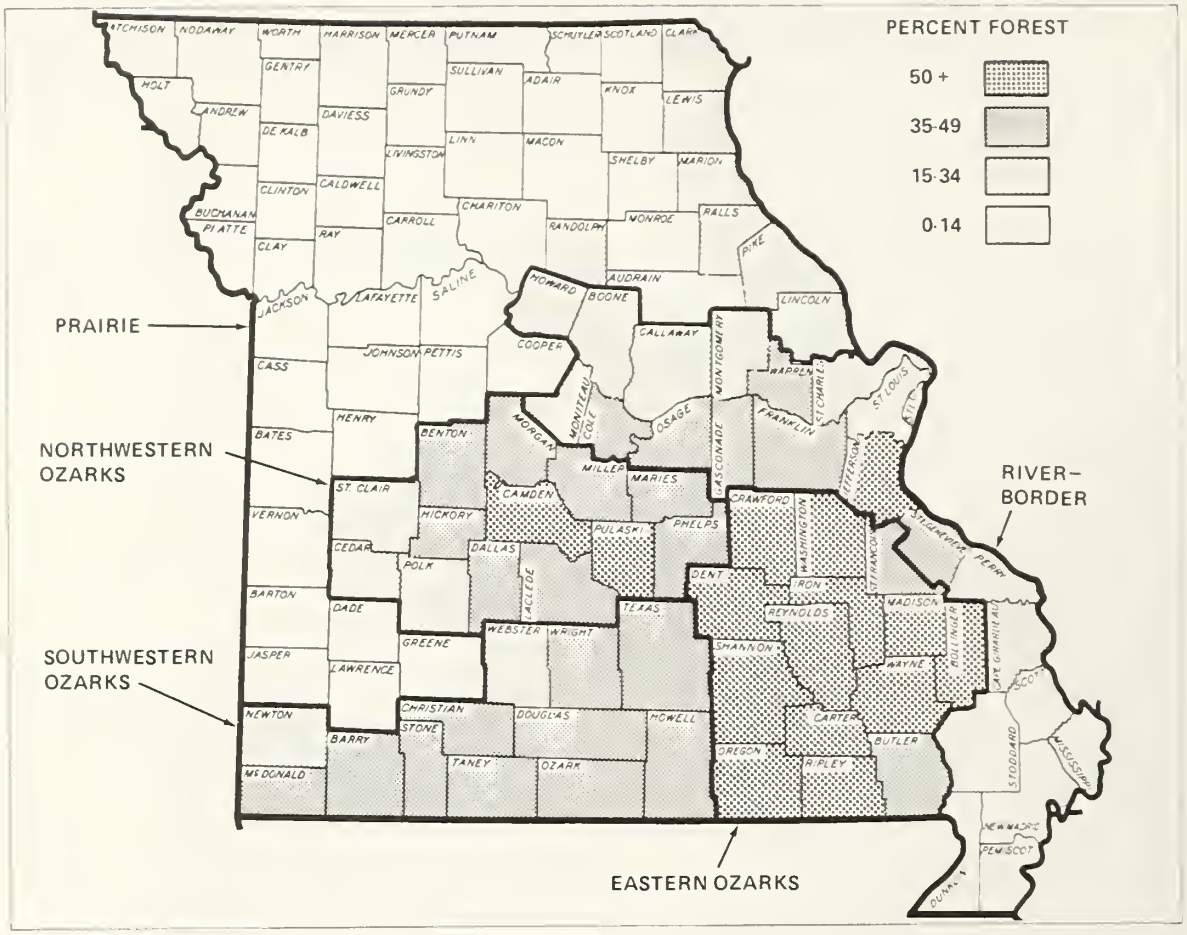

Figure 1.--*Commercial forest area as a percent of land area, by county, Missouri, 1972*

herbicides (12 percent) or by one or more grazing improvements such as cultivation, seeding, irrigation, pond construction, fence construction, or clearing of trees or brush (88 percent) (fig. 2). Many of these areas now provide forage for beef cattle. Significantly higher prices for cattle during the late 1960's and early 1970's provided the incentive for many farmers and other landowners to convert some or all of their slow-growing hardwood stands into more quickly profitable pasture. As long as cattle prices remain high in relation to the prices for timber products, the probability is high that even more commercial forest will be turned into pasture in the future. Similarly, if this price relation reversed some time in the future, part of the wooded pasture could return to commercial forest. Because the land is sufficiently stocked with trees to be classed as forest land, wooded pasture would be reclassified as forest land if livestock were removed in the future.

Environmentalists, wildlife biologists, and foresters, among others, have expressed concern over the impact of this large-scale transformation of forest to grass on wildlife numbers and habitat, recreational opportunities, the supply of timber to the State's wood-using industries, and the esthetic appeal to people. However, a landowner is free to use his land for whatever purposes will best satisfy his objectives for owning the land and, as will be discussed later, the bulk of Missouri's commercial forest is owned by farmers, private individuals, and corporations not directly engaged in timber processing.

Figure 2.--*Clearing commercial forest land by bulldozer is the most widely used method of converting these lands to pasture. (Photo courtesy of Missouri Department of Conservation.)*

Diversions of commercial forest to pasture were greatest in the Southwestern Ozarks Unit[5] (513 thousand acres) and the Prairie Unit (343 thousand acres).

Permanent sample plot remeasurement also permitted an estimate of the area of forest land treatment or disturbance between surveys. This estimate shows that on the 11,906 thousand acres that were classed commercial forest in 1959 and did not change classification between surveys, the following treatments occurred:

[5]*See figure 1 for location of Forest Survey Units.*

Treatment between 1959 and 1972	*Acres* (Thousand acres)
No treatment	9,207
Timber harvesting	2,513
Timber stand improvement, planting and seeding	143
Forest type conversion	43
Total	11,906

All Survey Units Showed Decline in Commercial Area

Area of commercial forests dropped in all Forest Survey Units but the decline was greater in some Units than in others. As seen in table 1, the Southwestern Ozarks Unit showed the largest drop in area, although proportionately, the Prairie Unit's loss was greatest at 19 percent.

acres), both in the Eastern Ozarks Unit, contain the largest commercial forest areas among counties.

Farmers Own Half the Commercial Forest

Farmers, private individuals, and corporations other than forest industries own 84 percent of the commercial forest area. Farmers alone own half of the total and are the group most likely to convert commercial forest to pasture in the future if cattle prices remain high. National forests are the second largest owner with 11 percent of the State's commercial forests.

Forty Percent of Area in Poletimber Stands

Poletimber stands with 40 percent of the commercial forest area, and sawtimber stands with 32 percent, dominate the State. Poletimber and sawtimber stands constituted the

Table 1.--*Area of commercial forest land by Forest Survey Unit for 1959 and 1972 and area change since 1959, Missouri*

Forest Survey Unit	Survey Year		Area change since 1959	
	1959	1972		
	Thousand acres		Thousand acres	Percent
Eastern Ozarks	4,259.4	4,084.0	-175.4	- 4.1
Southwestern Ozarks	2,815.4	2,311.4	-504.0	-17.9
Northwestern Ozarks	2,146.3	1,920.0	-226.3	-10.5
Prairie	2,408.8	1,940.4	-468.4	-19.4
Riverborder	2,188.4	2,108.9	- 79.5	- 3.6
Total	13,818.3	12,364.7	-1,453.6	-10.5

In addition to commercial forests, Missouri also has 554 thousand acres of noncommercial forest land. A little more than half of this (298 thousand acres) is unproductive and inherently incapable of growing industrial wood (fig. 3), and the remainder (256 thousand acres) is land withdrawn from commercial use, such as U.S. Army Corps of Engineers land around reservoirs and State parks or land adjoining National Scenic Rivers. Although these lands yield few, if any, industrial timber products they do provide recreational, wildlife habitat, scenic, and hydrologic benefits, and, therefore, are valuable assets to the State.

The Eastern Ozarks Survey Unit contains about one-third of the State's commercial forest area. Shannon County (477 thousand acres) and Reynolds County (423 thousand

largest stand-size classes in 1959 also, as shown in table 2, but their areas were smaller than the 1972 areas.

Sapling and seedling stands account for 20 percent of the commercial area and nonstocked area makes up the remaining 8 percent. Sapling and seedling stand area and nonstocked area for 1972 cannot be compared with 1959 areas because the procedures for estimating the number and species of seedlings on the acre being sampled in 1972 were substantially different from those employed in the 1959 survey. It does seem certain, though, that nonstocked area declined between surveys because of natural regeneration and tree planting. An average of 11,845[6] acres

[6] *USDA Forest Service. Reports of forest and windbarrier planting and seeding, 1959-1972.*

Figure 3.--*Cedar glades in the Ozark Mountains. The glades are highly important as wildlife habitat and also produce forage for livestock and redcedar products for industry. (Photo courtesy of Missouri Department of Conservation.)*

Table 2.--*Area of commercial forest land by stand-size class, Missouri, 1959 and 1972*

Stand-size class	1959		1972	
	Thousand acres	*Percent*	*Thousand acres*	*Percent*
Sawtimber	3,858	28	4,002	32
Poletimber	4,105	30	4,967	40
Sapling and seedling	([1])	([1])	2,472	20
Nonstocked areas	([1])	([1])	924	8
All classes	([1])	([1])	12,365	100

[1]Areas of sapling and seedling stands and nonstocked areas in 1959 are not comparable with those for 1972 because the procedures for estimating these areas have changed substantially.

were planted or seeded annually to forest trees, primarily shortleaf pine, between surveys.

Even though farmers and other private persons own 84 percent of the commercial forest area, as mentioned earlier, they own 96 percent of the nonstocked commercial forest.

Oak Types Dominate the Forest

Oak forest types cover three quarters of the area of commercial forest land. The black-scarlet oak forest type remains the largest in the State, as it was in 1959, although its area declined 15 percent between surveys. In 1972 the type included 4.4 million acres (36 percent of Missouri's commercial forest), and in 1959 it included 5.2 million acres (37 percent). The white oak type with 2.6 million acres in 1972 and the post-blackjack oak type with 2.5 million acres are the next largest types.

Softwood forest types account for only 6 percent of the State's commercial area (fig. 4).

Only 4 percent of the State's commercial forest area is composed of stands with more than 5,000 board feet per acre. Sixty-six percent of the area contains stand volumes of less than 1,500 board feet per acre. Stand volumes are highest on the national forests where 10 percent of the stands have more than 5,000 board feet per acre.

A measure of how well the forest is being utilized by the various classes of trees composing the forest tells much about the condition and future of the forest. Tree stocking, expressed as a percent of the minimum stocking required to make full use of the site, is one such measure. Overall, stocking of live trees (growing stock, rough, and rotten) in 1972 was good, but stocking of growing-stock trees alone is much lower. Forty-four percent of the commercial forest area is well stocked or better (100 percent stocking or more), and an additional 54 percent is medium stocked (60 to 99 percent stocked) with live trees. However, when only growing-stock trees are considered, the same proportions fall to 2 percent and 30 percent. Further, 61 percent of the forest is poorly stocked (16.7 to 59 percent stocked) with growing-stock trees.

Stocking of Rough and Rotten Trees High

That there is heavy stocking of rough and rotten trees in Missouri's forests is evidenced by the wide difference between the level of stocking of live and of growing-stock trees. Also, 61 percent of the number of live trees in the State at least 1-inch d.b.h. are rough and rotten. And 42 percent of the number of sawtimber trees throughout Missouri are rough and rotten. Most of these trees are rough--those not classed as growing stock because of limbiness, poor form, or noncommercial species.

This large presence of rough (except short-log trees) and rotten trees in the State's forests is an obstacle to intensive forest management. Even though these trees have value esthetically, as wildlife habitat, and for low-value timber products such as fuelwood, their large numbers take up an unacceptable amount of growing space that could better be utilized by more valuable trees. Land owners and land managers will need to be convinced of the profitability of removing such trees before forests can be improved on a large scale. The markets generated by the growing demand for wood, the concurrent rise in wood prices, and the search for ways to increase wood fiber yield, should provide a more favorable climate for the removal of rough and rotten trees.

Short-log trees of some species--especially black walnut--are extremely valuable for veneer logs and other products.

The Forestry Incentives Act of 1973, a program that allocates Federal money to States for distribution to private landowners to offset part of the cost of approved forest improvement projects, provides another vehicle for bringing about rough and rotten tree removal. Missouri ranked 13th out of the 50 States in the apportionment of Federal money for implementation of the Act during 1974. The procedure used to apportion this money is based upon a study of the relative amounts of worthwhile timber investments in each State.[7]

In this study nonindustrial private commercial forest land in each State, in ownerships of less than 500 acres, was grouped into "area cells" of similar forest types,

[7] *Mills, Thomas J., Thomas P. Hart, and J. S. McKnight. 1974. Forestry incentives: how funds were apportioned to States in 1974. J. For. 72(8):478-482.*

Figure 4.--*A shortleaf pine plantation approximately 12 years old in Crawford County. Although only a small percentage of the softwood forest types result from plantations, such plantings have esthetic and wildlife values as well as the obvious value as a potential timber crop.*

stand-size classes, and site classes. These "area cells" were weighted by the estimated rate of return that investments in stands typical of that cell can earn. The "area cells" were further weighted by the proportion of area within the cell that is capable of earning the above rate of return. The percent of funds apportioned to an individual State was equal to the weighted area in that State divided by the sum of the weighted areas of all States. The estimated area of commercial forest eligible for the incentive program in Missouri for 1974 was 10.8 million acres. One of the major investment opportunities identified as being sufficiently productive as measured by financial return was timber stand improvement and cull tree removal in the oak-hickory type.

Eighty-Three Percent of Commercial Area on Average or Low Sites

Site index[8] offers a practical, if inexact, method of estimating the present productivity of forest land, based on the fact that the most productive land usually grows the tallest trees at an index age (50 years in this report). The following tabulation shows the general range in site-index class for various levels of productivity in the Midwest (wide variation exists between species):

Site index class	*Description*
55 or less	Low site
56 to 70	Average site
More than 70	High site

Site-index measurements made as part of the Missouri survey show that 68 percent of the commercial forest is capable of growing trees 50 feet and taller at age 50, but only 17 percent of the area is capable of growing trees 70 feet and taller at the same age. In general, the best sites are those with deep soils derived from dolomite or limestone, and the poorer sites are on shallow soils or those derived from sandstone.

Site class, a means of grouping lands according to their inherent capacity to grow crops of industrial wood, is a measure of the potential productivity of forest land and should not be confused with site-index class. The following tabulation shows the percent of commercial forest in Missouri in each site class, representing levels of potential growth in cubic feet per acre per year provided that all stands had an optimum distribution of age classes and were fully stocked and adequately protected.

Site class (Cubic feet of potential growth per acre per year)	*Percent of commercial forest area*
120 or more	(9)
85 to 119	4
50 to 84	24
Less than 50	72
Total	100

[8] *Site index is the height in feet of average dominant or codominant trees at 50 years of age. For example, site index 50 for white oak means that the height of dominant or codominant trees in that area averages 50 feet at 50 years of age.*

[9] *Less than 0.5 percent.*

Productivity can be improved over that indicated above by fertilizing stands, by planting genetically superior trees, and by type conversion.

Six-Tenths of Timber Younger Than 50 Years

On 58 percent of the commercial area, stands are less than 50 years old[10] and on 81 percent of the area, stands are less than 70 years old (fig. 5). These generally young stands are grouped into 10-year age classes of roughly equal areas up to age 70. Even though most stands are fairly young, there are sizeable areas that are over rotation age, i.e., overmature. Figure 6 shows the area of overmature stands for all the oak types (77 percent of the commercial area) using a rotation age of 80. (This is a conservative representation of the overmature oak area because for stands of site index less than 60 feet, a rotation of 50 years is suggested in table 13. A shorter rotation would mean a larger proportion of the area of the type would be classified as overmature.)

A distribution of areas within age classes as nearly balanced as possible is desirable for those forest types that can best be managed under even-aged conditions, such as the oak types. If the management objective is to perpetuate oaks in oak types, this can best be accomplished by reproducing and growing these species in even-aged groups or stands.[11] As shown in figure 6, the oak distribution of area by age classes is reasonably well balanced up to age 80, in spite of a disproportionately large area of stands 40 to 59 years old.

Volume of Growing Stock Rises 5 Percent

Volume of growing stock on commercial forest land increased from 5.7 billion cubic feet in 1959 to 6.0 billion cubic feet in

[10] *Even though many stands in the State are uneven-aged, stand-age refers to the main stand--those trees of the dominant forest type and stand-size class.*

[11] *Clark, F. Bryan, and Richard F. Watt. 1971. Silvicultural methods for regenerating oaks. In Oak Symp. Proc., Morgantown, W. Virginia, Aug. 16-20, 1971: p. 37-43, illus., Northeast. For. Exp. Stn., Upper Darby, Pa.; and Sander, Ivan L., and F. Bryan Clark. 1971. Reproduction of upland hardwood forests in the Central States. U.S. Dep. Agric., Agric. Handb. 405, 25 p., illus.*

Figure 5.--*Most stands in the State are young--less than 50 years old--like this oak-hickory stand in Crawford County.*

1972, a 5 percent gain. Softwood growing-stock volume, although only a minor portion of the total, enlarged by 27 percent while hardwood volume grew by 4 percent. The following tabulation compares growing-stock volumes for 1959 and 1972:

	1959	*1972*
	(Million cubic feet)	
Softwoods	292	369
Hardwoods	5,425	5,633
Total	5,717	6,002

These volume gains were made despite the 10 percent decline in commercial forest area mentioned earlier. This seemingly paradoxical situation exists because the areas of sapling and seedling stands and of nonstocked areas, both with low volumes per acre, declined between surveys; but the areas of sawtimber and poletimber stands, with higher volumes per acre, increased.

Growing-stock volume did not increase uniformly throughout the State, and in some Survey Units volume declined between surveys (table 3). Volume was higher in the Eastern Ozarks Unit in 1972 than in any other Unit, with 37 percent of the total volume. Volume in the Eastern Ozarks was also highest in 1959.

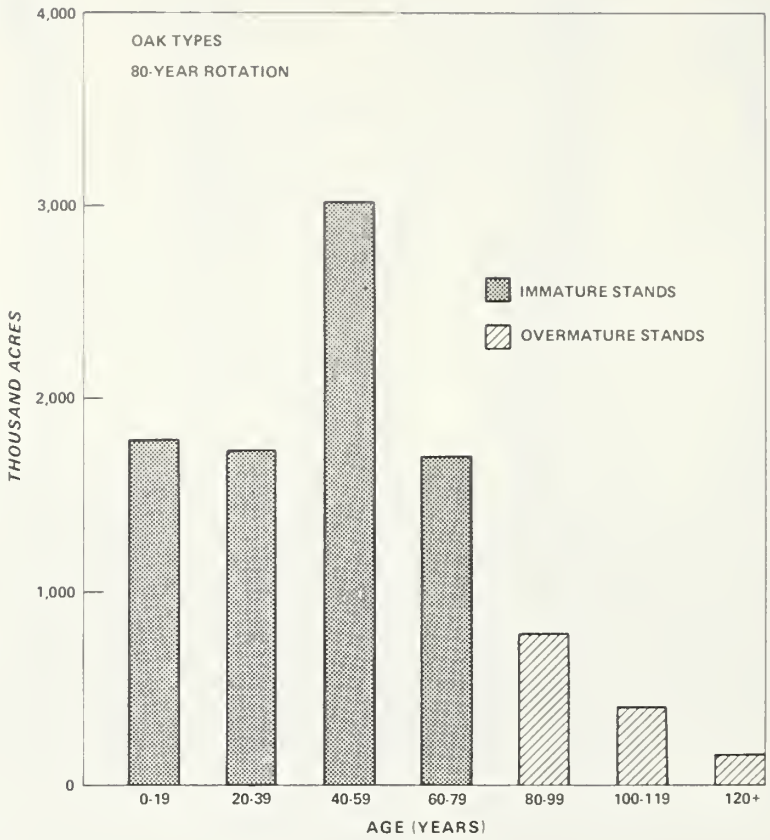

Figure 6.--*Area of all oak forest types on commercial forest land by stand age class and undermature and overmature area based on a rotation age of 80 years, Missouri, 1972*

Table 3.--*Growing-stock volume in 1972 and change since 1959, Missouri*

Survey unit	Softwoods: 1972 volume	Softwoods: change since 1959	Hardwoods: 1972 volume	Hardwoods: change since 1959
	Million cubic feet	Percent	Million cubic feet	Percent
Eastern Ozarks	253.8	+ 55	1,961.8	+ 28
Northwestern Ozarks	8.0	+129	670.8	+ 8
Southwestern Ozarks	63.8	- 34	787.3	- 9
Riverborder	39.7	+ 44	1,294.1	- 1
Prairie	3.5	(1/)	918.7	- 16
Total	368.8	+ 27	5,632.7	+ 4

1/ No volume recorded in 1959.

The six counties with the highest growing-stock volumes are all in the Eastern Ozarks Unit (fig. 7): Shannon (250 million cubic feet), Reynolds (237), Washington (200), Wayne (191), Crawford (173), and Dent (163).

Average volume per acre of growing stock in the State in 1972 was 485 cubic feet (6.1 cords) compared to 414 cubic feet (5.2 cords) in 1959. The highest average volume per acre is found in the Riverborder Unit--632 cubic feet (8.0 cords).

Hardwoods account for 5.6 billion cubic feet or 94 percent of the 1972 growing-stock volume. The oaks clearly dominated with 4.3 billion cubic feet, 71 percent of growing-stock volume. Hickories represent the second largest volume of a species group with 0.6 billion cubic feet, 9 percent of the total. Softwoods constitute a small but expanding portion of the growing-stock volume, amounting to 0.4 billion cubic feet, 6 percent of the total. Much of the softwood volume gain probably results from the growth between surveys of smaller trees into poletimber and sawtimber size in plantations.

Substantial volume increases between surveys were made by the red oaks,[12] and smaller increases were made by hickory B, shortleaf pine, and sycamore. Modest volume declines were made by other white oaks, select red oaks, and hickory A. Elm volume dropped precipitately, the result of mortality from Dutch elm disease.

Growing-stock volumes increased between surveys in the 10- to 18-inch diameter classes, but declined in diameter classes both smaller and larger (fig. 8).

[12] *The red oak group includes scarlet, southern red, and black oaks. See Principal Tree Species in Missouri in Appendix for composition of other species groups.*

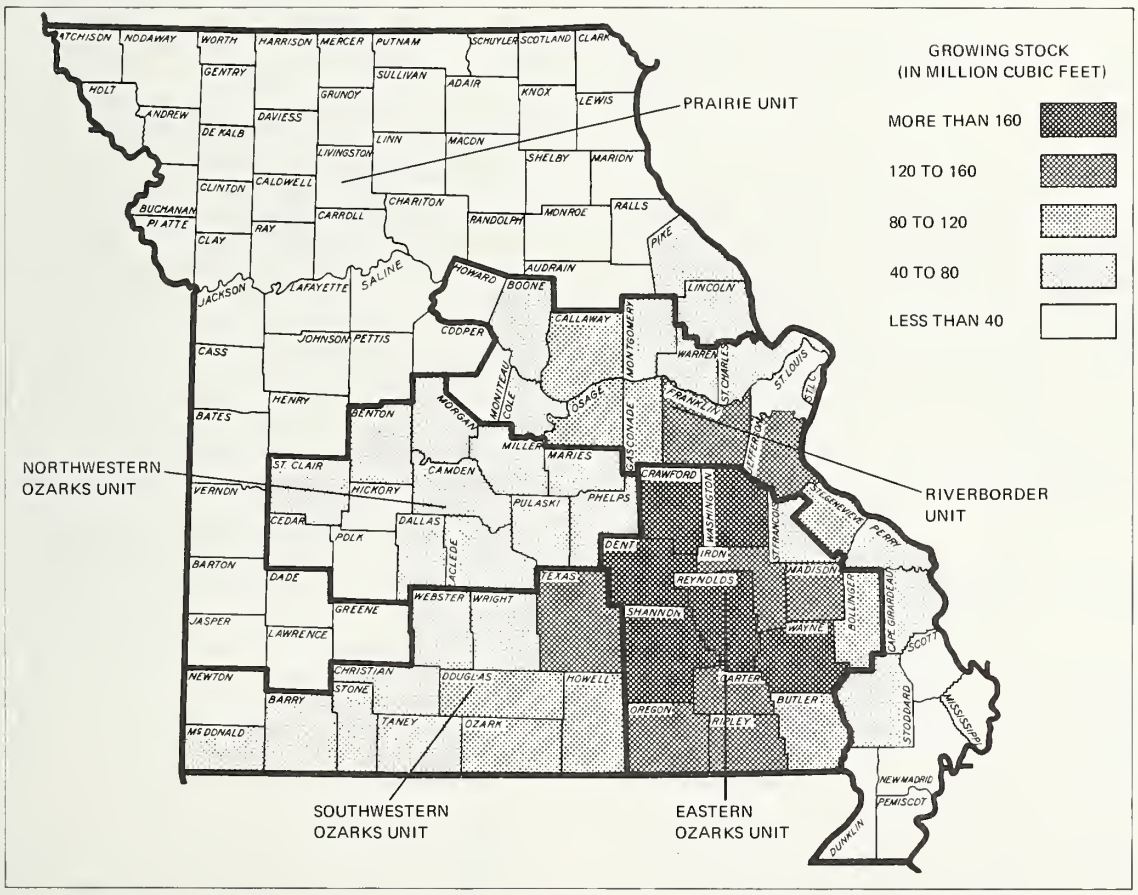

Figure 7.--*Growing-stock volume in Missouri counties, 1972.*

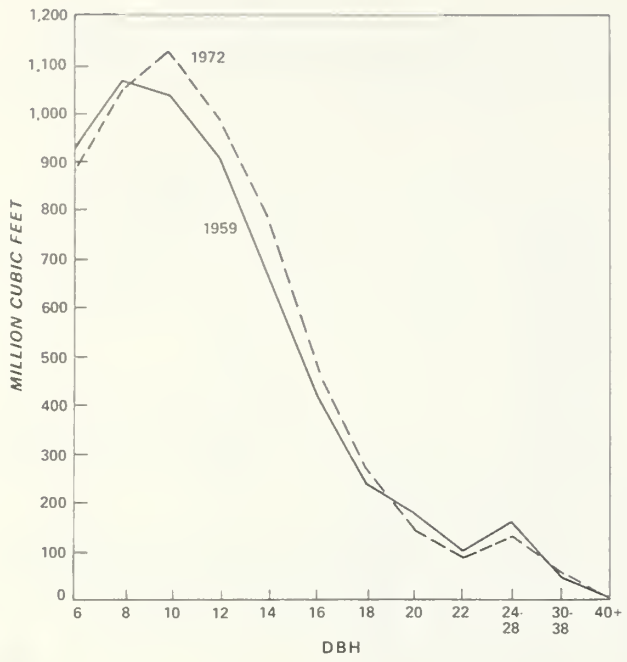

Figure 8.--*Distribution of growing-stock volume by diameter class, Missouri, 1959 and 1972*

Farmers, private individuals, and corporations other than forest industries own 81 percent of the growing-stock volume, while owning 84 percent of the commercial area. National forests contain 14 percent of the growing-stock volume and 11 percent of the commercial area. A disproportionate share of the shortleaf pine volume (53 percent) is found on national forest land, and farmers, private individuals, and corporations other than forest industries own only 38 percent of the pine volume.

Nongrowing-Stock Volume Equal to Half of Growing-Stock Volume

Volume of nongrowing-stock trees in the State amounts to 3.1 billion cubic feet, in addition to the 6.0 billion cubic feet of growing stock. Most of the nongrowing-stock volume is in cull trees, that is rough or rotten trees; the bulk being in "other rough trees," as seen in the tabulation below. This large volume of rough and rotten trees is further evidence of the dimensions of the cull tree problem and of the potential significance of this heretofore lightly used resource.

Class of timber	*Volume* (Million cubic feet)
Rough trees:	
Short-log trees	485.5
Other rough trees	2,057.9
Rotten trees	456.4
Salvable dead trees	141.0
Total	3,140.8

Short-log trees are sawtimber-sized trees of commercial species that are comparable in every way to a sawtimber tree except in merchantable height, and contain at least one 8- to 11-foot saw log but not a 12-foot or larger saw log. Rough trees are those that do not contain a 12-foot saw log or two noncontiguous 8-foot saw logs because they are crooked or rough or of noncommercial species. Both short-log and rough trees are an important potential source of additional wood fiber when needed, and would lend themselves well to whole-tree chipping when this technology becomes a reality in Missouri.

Black Walnut Volume Equals 97 Million Cubic Feet

The volume of black walnut, a highly valuable species in great demand, diminished slightly between surveys. In 1959, walnut growing-stock volume on commercial forest land was 100 million cubic feet, and in 1972 it amounted to 97 million. In addition to growing-stock volume there was 71 million cubic feet of nongrowing stock on commercial forest land in 1972--in rough trees (49 million cubic feet), short-log trees (14 million), and rotten trees (8 million). In addition to the above volumes on commercial forest land, an estimate was made of black walnut volume on nonforest land because of the interest in this species. Growing-stock volume of these trees, which are highly scattered, is 20 million cubic feet. Rough and rotten black walnut volume on nonforest land totals 28 million cubic feet.

Sawtimber Volume Increased 13 Percent

The sawtimber portion[13] of the growing-stock volume increased from 13.3 billion

[13] *Sawtimber trees are growing-stock trees that contain at least one 12-foot saw log or two noncontiguous saw logs, each 8 feet or longer and at least 9.0 inches d.b.h. for softwoods and at least 11.0 inches d.b.h. for hardwoods.*

board feet[14] in 1959 to 15.1 billion board feet in 1972. This amounts to a gain between surveys of 13 percent compared to the 5 percent gain registered by growing-stock volume. Softwood sawtimber volume increased 58 percent and hardwood sawtimber volume gained 10 percent from 1959 to 1972, as shown below:

	1959	*1972*
	(Million board feet)	
Softwoods	746	1,180
Hardwoods	12,596	13,875
Total	13,342	15,055

Like growing-stock volume, sawtimber volume did not increase in every Survey Unit nor was the rate of increase the same for those Units that did post an increase (table 4). Total sawtimber volume remained highest in the Eastern Ozarks Unit.

Hardwoods make up 13.9 billion board feet or 92 percent of the sawtimber volume, compared to 94 percent of the growing-stock volume. The oaks dominate, as they do growing-stock volume, with 10.6 billion board feet or 71 percent of the sawtimber volume. Softwoods account for 1.2 billion board feet or 8 percent of the sawtimber volume.

Between 1959 and 1972, large sawtimber volume gains were made by red oaks, shortleaf pine, sycamore, select white oaks, hickory B, and cottonwood. Significant volume declines were made by select red oaks and other white oaks, and a large volume loss was recorded for elm.

Ownership of the sawtimber volume is in the same proportion as growing-stock volume. A slight difference is that 61 percent of the shortleaf pine sawtimber is found on national forest land, versus 53 percent of the shortleaf pine growing-stock volume.

Table 4.--*Sawtimber volume in 1972 and change since 1959, Missouri*

Survey Unit	Softwoods		Hardwoods	
	1972 volume	Change since 1959	1972 volume	Change since 1959
	Million board feet 1/	Percent	Million board feet 1/	Percent
Eastern Ozarks	838.7	+ 90	4,447.8	+ 46
Northwestern Ozarks	35.3	+284	1,548.8	+ 18
Southwestern Ozarks	197.2	- 11	1,888.0	- 5
Riverborder	94.2	+ 30	3,546.9	+ 2
Prairie	14.6	(2/)	2,443.4	- 12
Total	1,180.0	+ 58	13,874.9	+ 10

1/ International 1/4-inch rule.
2/ No volume recorded for 1959.

The first five counties with the largest sawtimber volumes are all in the Eastern Ozarks Unit and are in the same order as those with highest growing-stock volumes: Shannon (584 million board feet), Reynolds (560), Washington (485), Wayne (461), and Crawford (412). The sixth county, Franklin, is in the Riverborder Unit and contains 409 million board feet of sawtimber.

Average volume per acre of sawtimber in 1972 was 1,218 board feet compared to 966 board feet in 1959. The highest average volume per acre is in the Riverborder Unit, 1,727 board feet.

[14] *International ¼-inch log rule.*

Seventy Percent of Sawtimber Volume in Lowest Two Log Grades

An estimate of the quality of sawtimber shows that 50 percent of the sawtimber volume is in grade 3 logs. (Log grade standards used for each species are indicated in the Appendix.) Table 5 shows the proportion of sawtimber volume in each log grade for softwoods and hardwoods. The proportion of volume in log grade 1 is significantly higher for sycamore (29 percent) and cottonwood (14 percent) than the hardwood average. Species with above average proportions of sawtimber volume in tie and timber logs, poorest of the four log grades, were other red oaks (58 percent), sweetgum (49 percent), hard maple (38 percent), and hickory B (34 percent).

Table 5.--*Percent of sawtimber volume by log grade and softwoods and hardwoods, Missouri, 1972*

(In percent)

Log grade	All species	Softwoods	Hardwoods
Grade 1	8	13	8
Grade 2	22	14	23
Grade 3	50	73	47
Tie and timber	20	([1])	22
Total	100	100	100

[1]Less than 0.5 percent.

Sawtimber Volume of Black Walnut Amounts to 217 Million Board Feet

Black walnut sawtimber volume on commercial forest land declined slightly between surveys, from 238 million board feet in 1959 to 217 million in 1972. Sixty-five percent of the 1972 walnut volume is in grade 3 logs, compared with 50 percent of the total sawtimber volume. Twenty-five percent of the walnut volume is in grade 2 logs, 9 percent is in grade 1 logs, and 1 percent is in tie and timber logs. Walnut volume on nonforest land includes 70 million board feet in sawtimber trees and 19 million board feet in short-log trees. Table 6 shows the sawtimber volume of black walnut on commercial forest land and on nonforest land by tree class.

Growth Rate is 3 Percent

Net annual growth on growing-stock trees amounted to 177 million cubic feet (2.2 million cords) in 1971. Net growth expressed as a percent of growing-stock inventory is 3.0 percent. The growth rate is slightly higher for softwoods (3.5 percent) than for hardwoods (2.9 percent). Growth averages 14.3 cubic feet per acre (0.2 cords).

Table 6.--*Sawtimber volume of black walnut on commercial forest land and on nonforest land by tree class and by Forest Survey Unit, Missouri, 1972*

(In million board feet[1])

Tree class	Forest Survey Unit					Total
	Eastern Ozarks	Southwestern Ozarks	Northwestern Ozarks	Prairie	River-border	
Commercial forest land:						
Sawtimber trees	22.7	26.2	18.3	98.0	51.7	216.9
Rough trees	3.1	4.4	7.5	31.2	2.0	48.2
Short-log trees	3.5	2.9	4.3	26.0	2.6	39.3
Rotten trees	1.3	0.5	0.8	4.4	2.7	9.7
Subtotal	30.6	34.0	30.9	159.6	59.0	314.1
Nonforest land:						
Sawtimber trees	7.0	10.3	7.1	31.6	13.5	69.5
Rough trees	11.3	1.4	1.8	28.5	0.9	43.9
Short-log trees	0	2.0	2.9	13.2	1.3	19.4
Rotten trees	1.6	1.0	1.4	1.9	2.5	8.4
Subtotal	19.9	14.7	13.2	75.2	18.2	141.2
Total	50.5	48.7	44.1	234.8	77.2	455.3

1/ International 1/4-inch rule.

Permanent sample plot remeasurements permitted singling out the various components of gross growth (table 7). Survivor growth, the increment added by trees at least 5.0 inches d.b.h. that were classed as growing-stock trees both at the beginning and at the end of the year, contributed 60 percent of gross growth. Ingrowth, the net volume of growing-stock trees that reached 5.0 inches d.b.h. during the year, added another 21 percent; and growth on ingrowth contributed 9 percent. Growth before death on trees that died during the year, growth on removals before cutting, and growth on trees classed as growing stock at the beginning of the year but as culls at the end of the year (cull increment), together amounted to 10 percent of gross growth.

Mortality of growing-stock trees amounted to 13.0 million cubic feet in 1971, and lowered gross growth 5.6 percent. Expressed as a percent of inventory, mortality was 0.2 percent.

Half of the volume of mortality was caused by diseases. Weather, fire, and suppression by trees or other vegetation were other important causes of tree death. Dutch elm disease was probably the most damaging disease, killing elms over the entire State. Root rots, particularly Armillaria root rot, and oak wilt are other diseases that cause significant tree mortality.

Sawtimber mortality totaled 30 million board feet and amounted to 0.2 percent of sawtimber inventory.

When mortality and cull increment are subtracted from the 231 million cubic feet of gross growth, the resulting 177 million cubic feet of net growth represents 77 percent of gross growth.

Timber Removals Rate 2.8 Percent

Timber removals from growing stock in 1971 were estimated to total 168 million cubic feet or 2.1 million cords (fig. 9). Only 44 percent of total removals was harvested for roundwood products. Other removals[15] accounted for 47 percent and logging residues made up the remaining 9 percent.

[15] *Other removals are trees removed but not utilized for products or trees left standing but "removed" from the commercial land classification by land-use change.*

Managed Harvest Compared with Removals

A comparison sensitive to the biological requirements of the State's timber stands is one between timber removals and average annual managed harvest. As described in more detail in the Appendix, managed harvest is the average volume of timber it is advisable to harvest annually from commercial forest land to maintain or increase tree stocking and to bring about a more even distribution of age classes.

In Missouri, annual managed harvest was determined by computer using an area control system for computing the number of acres to be harvested yearly. Managed harvest is shown separately for harvest cutting and for thinnings. The harvest cut of sawtimber was calculated from stands of forest types normally managed for sawtimber whose site index and age indicated they were ready for harvest, or would be within the next 10 years. Stands not yet ready for harvest but overstocked by basal area standards were "thinned" by the computer back to their recommended stocking level. The harvest cut of growing stock included that of sawtimber in addition to the volume from stands of forest types normally managed for pulpwood that were or would be rotation age within the next 10 years. Finally, the computer collated the volume to be cut by species into the type of cut--either harvest cut or thinning and whether for growing-stock or sawtimber.

Implicit in the managed harvest calculations are a number of assumptions: that all timber will be available and accessible when needed; that a ready market will exist for every species, size, and grade of material harvested; and others. Because these assumptions may not be fully functional during the next decade, managed harvest should be regarded as a level closely approaching the ideal as dictated solely by silvicultural criteria. As such, managed harvest should normally represent a somewhat higher volume than actual timber removals which are constrained by problems of economics, markets, availability, accessibility, and landowner ability or willingness to practice forest management. Therefore, managed harvest tends to be liberal, and when actual removals exceed it, especially for long periods, overutilization of the resource is a strong possibility.

Removals about Equal to Managed Harvest

A comparison of growing-stock managed harvest for Missouri during 1972-1981 (156

Table 7.--*Annual components of change of growing-stock volume on commercial forest land, by Survey Unit and by softwoods and hardwoods, Missouri, 1971*

(In thousand cubic feet)

Survey Unit and species group	Gross growth	Components of growth						Mortality	Cull increment	Net growth	Removals	Net change
		Survivor growth	Ingrowth	Growth on ingrowth	Growth on mortality	Growth on removals	Growth on cull increment					
Eastern Ozarks:												
Softwoods	9,035	5,757	2,205	994	112	459	108	305	787	8,543	2,100	+ 6,443
Hardwoods	79,150	47,493	16,745	6,369	867	3,890	3,786	2,942	13,418	62,790	38,800	+23,990
Total	88,785	53,250	18,950	7,363	979	4,349	3,894	3,247	14,205	71,333	40,900	+30,433
Southwestern Ozarks:												
Softwoods	2,709	1,560	427	81	3	627	11	91	35	2,583	5,100	- 2,517
Hardwoods	26,815	14,740	7,581	3,173	130	611	580	1,766	2,267	22,782	27,000	- 4,218
Total	29,524	16,300	8,008	3,254	133	1,238	591	1,857	2,302	25,365	32,100	- 6,735
Northwestern Ozarks:												
Softwoods	374	194	171	9	--	--	--	--	--	374	241	+ 133
Hardwoods	23,002	15,392	4,123	1,449	227	294	1,517	739	5,881	16,382	12,400	+ 3,982
Total	23,376	15,586	4,294	1,458	227	294	1,517	739	5,881	16,756	12,641	+ 4,115
Prairie:												
Softwoods	110	57	50	3	--	--	--	--	--	110	2	+ 108
Hardwoods	43,984	23,331	9,691	4,902	1,919	856	3,285	4,746	9,679	29,559	46,500	-16,941
Total	44,094	23,388	9,741	4,905	1,919	856	3,285	4,746	9,679	29,669	46,502	-16,833
Riverborder:												
Softwoods	1,791	550	628	448	--	70	95	--	315	1,476	856	+ 620
Hardwoods	43,111	28,790	8,144	2,368	735	1,567	1,507	2,366	8,044	32,701	34,700	- 1,999
Total	44,902	29,340	8,772	2,816	735	1,637	1,602	2,366	8,359	34,177	35,556	- 1,379
State:												
Softwoods	14,619	8,118	3,481	1,535	115	1,156	214	396	1,137	13,086	8,299	+ 4,787
Hardwoods	216,062	129,746	46,284	18,261	3,878	7,218	10,675	12,559	39,289	164,214	159,400	+ 4,814
Total	230,681	137,864	49,765	19,796	3,993	8,374	10,889	12,955	40,426	177,300	167,699	+ 9,601

Figure 9.--*The rate of timber removals from growing stock in 1971 was 2.8 percent of growing-stock volume. (Photo courtesy of Missouri Department of Conservation.)*

million cubic feet) with 1971 growing-stock removals (157 million cubic feet) suggests no statewide overutilization. The timber removals used in this comparison are not the total removals referred to earlier (168 million cubic feet). The volume of removals from land classed as commercial forest in 1959 but classed as wooded pasture (nonforest land) in 1972 because of a change in definition, was deducted from total removals in order to make the comparison valid. These lands would have been classed as wooded pasture in 1959 had the same definition used in 1971 been applied; hence the portion of 1971 removals represented by trees left standing but "removed" from the commercial forest classification by definitional land-use change would not have been so "removed."

Overutilization of growing stock did occur in two of the five Forest Survey Units in the State--the Prairie and Southwestern Ozarks Units. The excess of removals over managed harvest was most extreme in the Prairie Unit where removals were double the volume of managed harvest.

The 508 million board feet of sawtimber removals over the State (adjusted from the 542 million board feet of total removals shown in the Appendix tables, as the volume of growing-stock removals was adjusted above) were practically equal to the 509 million board feet of annual managed harvest. Hardwoods were somewhat overutilized, but softwoods were underutilized by almost the same amount. Sawtimber overutilization occurred in the Prairie and Southwestern Ozarks Units, as it did for growing stock. Removals of sawtimber in the Prairie Unit were double managed harvest.

All species were not uniformly utilized. Of oak growing stock only red oaks--the species group with the largest volume in the State--and other red oaks were overutilized in three of the five Survey Units. Elm was the species most overutilized in terms of volume, but much of the elm removals were associated with the salvage of mortality caused by the Dutch elm disease. Cottonwood, soft maple, and sycamore were heavily utilized throughout the State. Select white oaks were the most underutilized species in terms of growing-stock volume. Other species whose removals were significantly less than managed harvest were other white oaks, hickory, shortleaf pine, and select red oaks. Table 8 shows the volume by which each major species is underutilized or overutilized for both growing stock and sawtimber.

Potential Harvest 3.3 Times Greater than Annual Managed Harvest

What volume of harvest could be expected if all of the State's commercial forest land area were distributed evenly by age classes and if all stands were fully stocked with growing-stock trees? How would this potential annual managed harvest compare with the annual managed harvest? To suggest answers to these questions an estimate of Missouri's potential annual harvest was made for each forest type by the same site-index groupings shown in table 13 in the Appendix. Site-class values based on normal yield tables were used to represent potential yield. Assumptions were made that stands would be harvested at the age of culmination of mean annual increment, that an equal area of each forest type would be harvested annually (area of commercial forest divided by rotation age of the type), and that rotation age

Table 8.--*Underutilized or overutilized volume by species for growing stock and sawtimber, Missouri, 1972*

Species	Underutilized		Overutilized	
	Growing stock	Sawtimber	Growing stock	Sawtimber
	Thousand cubic feet	Thousand board feet 1/	Thousand cubic feet	Thousand board feet 1/
Shortleaf pine	1,125	13,368	--	--
Select white oaks	9,213	22,928	--	--
Other white oaks	2,878	4,481	--	--
Select red oaks	986	14,895	--	--
Red oaks	--	16,359	1,250	--
Other red oaks	--	--	2,693	6,910
Hickory A	1,518	3,224	--	--
Hickory B	1,626	--	--	1,858
Soft maple	--	--	2,227	12,958
Tupelo and blackgum	643	750	--	--
Ash	--	--	370	962
Sycamore	--	--	1,217	7,597
Cottonwood	--	--	3,532	18,835
Black walnut	244	--	--	1,364
Elm	--	--	7,420	22,399
Other species	--	--	311	1,781
Total	18,233	76,005	19,020	74,664

1/ International 1/4-inch rule.

closely approximated age of culmination of mean annual increment. Rotation ages used were the same as those used in the calculation of annual managed harvest shown in table 13. Potential harvest, then, represents a level of annual sustained yield that approaches the maximum attainable. Although this potential cannot be achieved in the foreseeable future, it provides a benchmark against which future progress toward a more productive forest can be measured.

To estimate potential harvest, average site index was applied to the most appropriate available normal yield curve to determine mean annual increment per acre at culmination. This increment was multiplied by the rotation age (assumed to approximate age at culmination) to estimate normal harvest volume per acre. Finally, the resulting harvest per acre was multiplied by the area to be harvested annually, yielding potential annual managed harvest. These steps and a comparison of potential annual managed harvest with annual managed harvest that was discussed earlier, are shown in table 9.

The total estimated potential annual harvest (509 million cubic feet) is 3.3 times greater than present managed harvest (156 million). The oak types alone could contribute an additional 239 million cubic feet annually over the present managed harvest of 121 million cubic feet if all stands were fully managed for timber production over an entire rotation. Softwood types could yield a harvest greater by 21 million cubic feet than the present managed harvest of 10 million cubic feet, under the same managed conditions. In terms of the proportion of increase of potential over present managed harvest, the maple-beech type is highest with an increase of 397 percent, followed closely by the eastern redcedar-hardwood type with 385 percent, and the post-blackjack oak type with 254 percent.

Table 9.--*Estimation of potential managed harvest after one complete rotation by forest type and site index; and comparison with annual managed harvest, Missouri*

Forest type	Site index class	Commercial forest area	Rotation age	Annual harvest area	Average site index	Normal yield harvest volume per acre	Potential annual managed harvest[1/]	Annual managed harvest
	Feet	M acres	Years	M acres	Feet	Cu. ft.	Million cubic feet	
Shortleaf pine	+50	100.0	60	1.67	59	3540	6.4	3.4
	-50	16.0	40	.40	43	1240		
Shortleaf pine-oak	+60	123.1	80	1.54	68	6160	16.6	4.8
	-60	158.0	50	3.16	51	2250		
Eastern redcedar	+35	47.8	55	.87	41	1210	1.5	0.6
	-35	40.5	70	.58	30	700		
E. redcedar-hdwd.	+45	96.3	50	1.93	57	1900	6.3	1.3
	-45	163.1	60	2.72	36	960		
Black-scarlet oak	+60	2124.7	80	26.56	70	4960	191.1	59.9
	-60	2284.7	50	45.69	51	1300		
White oak	+60	632.7	80	7.91	71	4240	91.8	39.6
	-60	2011.8	50	40.24	48	1450		
Post-blackjack oak	All	2488.2	50	49.76	50	1550	77.1	21.8
Oak-gum-cypress	All	177.7	60	2.96	72	2640	7.8	4.5
Cottonwood	All	4.8	30	0.16	95	3900	0.6	0.2
Elm-ash-cottonwood	All	660.6	50	13.21	73	3800	50.2	17.2
Maple-beech	All	310.8	90	3.45	59	4320	14.9	3.0
Nonstocked	+50	531.5	60	8.86	62	3840	44.6	--
	-50	392.4	40	9.81	40	1080		
Total		12364.7					508.9	156.3

1/ Does not include harvest from thinnings.

TIMBER PRODUCTS OUTPUT

1969 Output of Timber Products 136 Million Cubic Feet

Missouri's harvest of roundwood products in 1969[16] was 124 million cubic feet, compared to 136 million cubic feet in 1958. The 1969 harvest included 75 million cubic feet from growing-stock trees and 49 million from nongrowing-stock sources. In addition to roundwood output, plant byproducts added another 12 million cubic feet, bringing the 1969 total timber products output to 136 million cubic feet.

Wood-using industries,[17] including both primary and secondary manufacturing plants, accounted for 21,300[18] employees or 4.9 percent of all employees of manufacturing firms in the State in 1972. These industries also paid wages of $157.9 million (4.0 percent of State total) and made new capital expenditures of $23.1 million (6.6 percent of State total). Value added by manufacture, the difference between the cost of goods purchased by an enterprise and the sales value of its product, amounted to $307.8 million in 1972 (3.8 percent of State total). These figures suggest something about the importance of timber to the State's economy.

Missouri boasts three major primary wood-using industries--lumber, charcoal, and cooperage. Other industries exist--veneer, wood pulp products, post and pole treating, tool handle production--but not of the same magnitude as the three major ones.

The total number of active, primary, wood-using plants dropped sharply between 1946 and 1958 and again between 1958 and 1969. Not all kinds of plants declined between surveys, some increased. In general, the average mill has been getting larger and average production per mill has increased.

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[16] *Timber products output information is dated 1969 rather than 1971 because the independent study that provided output data was conducted in 1969.*

[17] *U.S. Bureau of Census, Standard Industrial Code (SIC) 24, Lumber and Wood Products; and SIC 26, Paper and Allied Products.*

[18] *1972 Census of Manufactures (Preliminary Report).*

Sawmills Produced 368 Million Board Feet of Lumber in 1969

Of the 681 active, primary, wood-using plants in the State in 1969, 549 or 81 percent of them were sawmills. The 990 sawmills in 1958 represented 85 percent of the 1,161 total plants. Small sawmills, those producing less than 1 million board feet of lumber annually, dominated during both surveys, but the proportion of small sawmills declined from 89 percent of all sawmills in 1958 to 77 percent in 1969. Seven mills sawed 5 million board feet of lumber in 1969 compared with 5 in 1958 and 2 in 1946. The greatest concentrations of sawmills producing at least 1 million board feet annually are in the Eastern Ozarks and Southwestern Ozarks Units (fig. 10).

Missouri sawmills produced 368 million board feet of lumber in 1969, compared to 314 million board feet in 1958. Lumber production has generally increased since 1951 when a post-Depression low of 153 million board feet was sawn. In 1969, the average output per mill was 670 thousand board feet, more than double the average of 320 thousand board feet in 1958.

Sawmills acquired 390 million board feet of saw logs in 1969, 95 percent of which were produced in the State (fig. 11). Half of the 20 million board feet of saw logs shipped into Missouri was from neighboring Illinois and the remainder came from adjacent States and Indiana. Two-thirds (257 million board feet) of the volume of logs received at sawmills was from oak species. Cottonwood (25 million board feet), sycamore (20 million), soft maple (19 million), shortleaf pine (15 million), hickory (15 million), and black walnut (14 million) were other major species received. The species shipped into Missouri in the largest quantity was black walnut (4 million board feet), most of which came from Iowa and Kansas.

Missouri loggers harvested 21 percent more saw logs in 1969 (379 million board feet) than in 1958 (314 million board feet). The volume of most species harvested increased slightly between surveys except for a precipitous drop in white oak volume (from 121 million board feet in 1958 to 66 million in 1969), which was practically offset by a

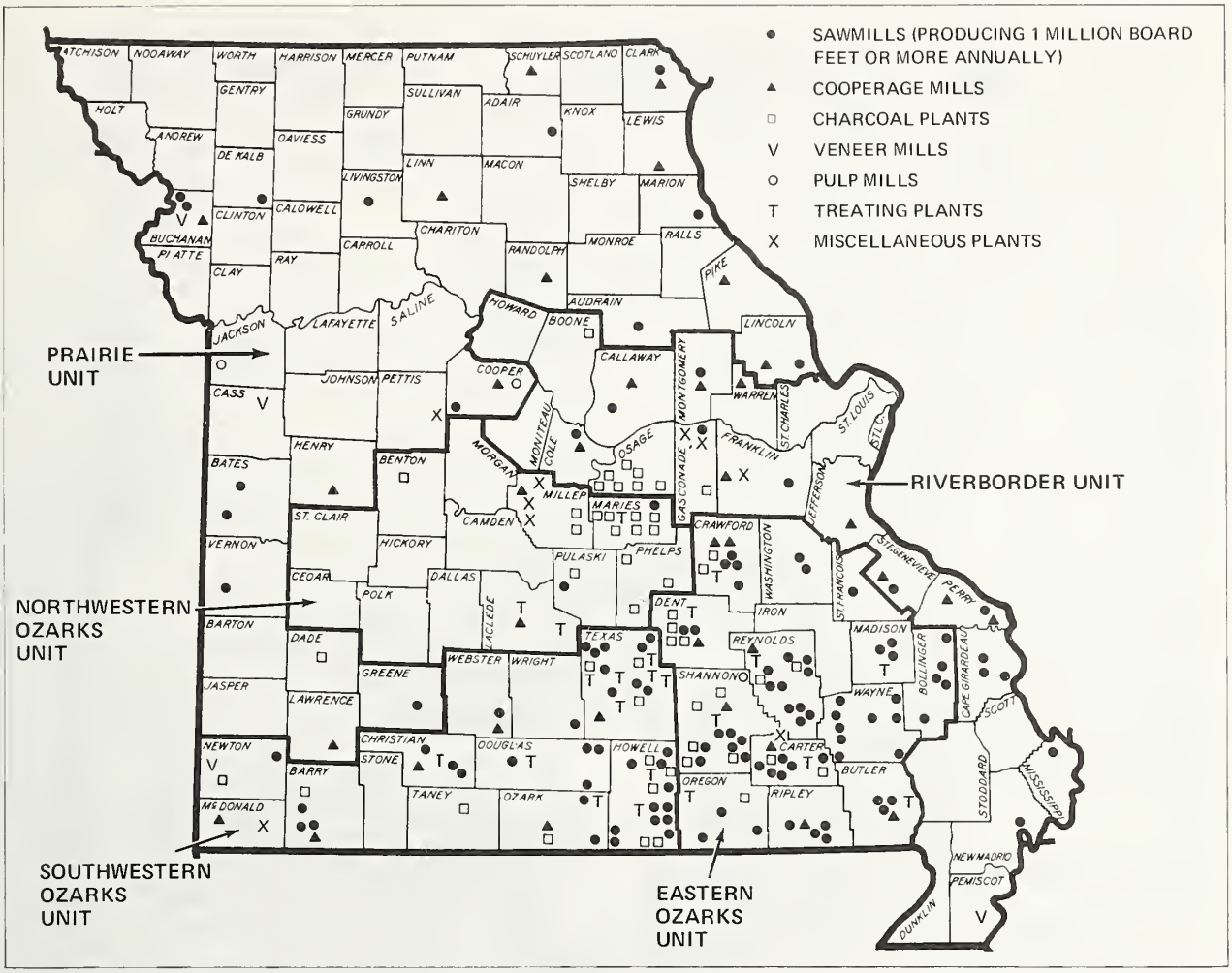

Figure 10.--*Primary wood-using plants in Missouri, 1969*

large gain in black oak volume (from 69 million board feet in 1958 to 117 million in 1969). Nine million board feet of Missouri-produced saw logs were exported to nearby States, primarily to Kansas, Illinois, and Kentucky.

Missouri is Leading Charcoal-Producing State

Missouri charcoal kilns turned out about 125,000 tons in 1969 out of a nationwide total of 500,000 tons, making it number one among States. The 52 active charcoal plants in 1969 represented a slight decline from the 60 plants operating in 1958. However, the volume of wood received at plants increased six times between surveys--from 3.2 million cubic feet in 1958 to 20.0 million in 1969.

Oak (86 percent) and hickory (12 percent) comprise most of the 16.7 million cubic feet of roundwood received at charcoal plants in 1969. Plant byproducts provided the remaining 3.3 million cubic feet. Essentially all the wood used for charcoal originated in Missouri.

The charcoal industry is an important consumer of low grade hardwoods, significant in Missouri with its large proportion of rough and rotten trees.

Cooperage Log Production Highest in Country

Loggers in Missouri produced 54 million board feet of cooperage logs and bolts in

Figure 11.--*Missouri sawmills procured 390 million board feet of saw logs in 1969, 370 million of which was harvested in the State, as these oak saw logs were. (Photo courtesy of Missouri Department of Conservation.)*

1969, more than any other State. Fifty-two million board feet of this total was shipped to cooperage mills within the State, the remainder sent out-of-State. Missouri cooperage mills also received 3 million board feet from Illinois and 2 million from Iowa for total log receipts of 57 million.

The number of cooperage plants remained constant at 36 between 1958 and 1969, but production of cooperage logs and their use nearly doubled between surveys because production per mill increased.

The Riverborder Unit provided 40 percent and the Eastern Ozarks Unit 27 percent of the cooperage logs produced in the State in 1969. Practically all of these logs were white oak.

Future Pulpwood Production Potential is High

Pulpwood production in 1969 was 81,000 cords, roundwood equivalent, a huge increase over the 1,200 cords produced in 1955. Two-thirds of the 1969 production was from plant byproducts,[19] the remainder from roundwood. The output of roundwood pulpwood has remained stable since 1964, but plant byproducts use in pulping has risen sharply. Only a small volume of Missouri byproducts are used in pulpmills within the State; most of it is shipped to Illinois.

Two pulpmills manufacturing fiberboard, roof insulation board, and roofing felt, are currently operating in Missouri. The combined capacity of these mills is 170 groundwood tons per 24 hours.

The potential is high for much greater pulpwood production in the future. The large volume of unused plant residue and the large number of cull trees throughout the State, presently unusable for high value products, offers a rich source of raw materials to a pulp and paper industry that is progressively hard pressed to locate new additional supplies of pulpwood in much of the rest of the country.

[19] *Plant byproducts are slabs, edgings, veneer cores, sawdust, etc., used for products.*

Output of Other Products Generally Declines

Other timber products are harvested in substantially less quantities than the above products, and the output of most has declined between surveys. For example, production of veneer logs fell from 7 million board feet in 1958 to 4.6 million in 1969. This decline was prompted by a shift of markets for Missouri logs from low value container veneers to high value face veneers. As a result, the species mix of veneer log output has changed from largely cottonwood and soft maple to chiefly black walnut and pecan. Overseas markets claimed 1.2 million board feet of black walnut veneer logs.

Production of round and split posts sank from 16 million pieces in 1958 to 4 million in 1969. Some of this drop is explained by the unknown but growing number of square sawn posts produced in the State.

Round pole production climbed from 62 thousand poles in 1958 to 90 thousand in 1969. Part of the increase is due to the growing number of shortleaf pines reaching pole size.

60 Percent of Plant Residues Unused

Primary wood-using plants generated a total of 31.5 million cubic feet of residues in 1969. Uses were found for 12.6 million cubic feet, chiefly for fiber products (4.4 million cubic feet), charcoal (3.3 million), and fuel (2.7 million). However, 18.8 million cubic feet (60 percent) of the total was unused. Of the unused portion, 7.9 million cubic feet (100,000 cords) was coarse residue suitable for chipping, and 9.4 million cubic feet (118,987 cords) was fine residue, primarily in the form of sawdust and shavings useful for livestock bedding, mulch, soil conditioners, and others.

This large volume of unused plant residues represents a rich vein of resources, more of which will probably be exploited by industry or private entrepreneurs in the future. Most of the plant residues are concentrated in the Eastern Ozarks and Southwestern Ozarks Units, and most of the residues presently used are exported, chiefly to Illinois and Kentucky. Increasing demand in those two States makes the outlook for Missouri residues bright.

FUTURE TIMBER SUPPLY

A recent projection of potential United States demand for roundwood shows a rise from the 1970 level of 12.7 billion cubic feet to 20.7 billion cubic feet by the year 2000.[20] This projection is based on the assumption that through the projection period relative wholesale prices of lumber and plywood would be 30 percent, miscellaneous products and fuelwood 15 percent, and paper and board 10 percent above 1970 average prices. This "medium" projection of the three sets of price assumptions[21] suggests that national softwood demand will increase 47 percent from 9.7 billion cubic feet in 1970 to 14.3 billion cubic feet in 2000. Hardwood demand is projected to spurt 113 percent, from 3.0 billion cubic feet in 1970 to 6.4 billion cubic feet in 2000.

Projected national supplies of roundwood--assuming 1970 levels of timber management, cutting practices, and policies--are estimated to increase from 12.2 billion cubic feet in 1970 to 18.8 billion cubic feet in 2000. This is a technical potential assuming no problems of operability or availability and, therefore, may not be realized. Softwood supplies are projected to increase from 9.0 billion cubic feet in 1970 to 11.5 billion cubic feet in 2000, considerably short of the above-projected demand of 14.3 billion cubic feet. Hardwood supplies are projected to increase from 3.2 billion cubic feet in 1970 to 7.3 billion cubic feet in 2000, somewhat more than the projected demand of 6.4 billion cubic feet in 2000. In spite of the apparent adequate supply of hardwoods to meet demand at the end of the century, the outlook for hardwoods is clouded by problems of tree quality, size, markets, and availability.

In general these projections suggest stringent timber demand-supply relations by 2000, more so for softwoods than for hardwoods and more so for some timber products than for others. How will Missouri fit into this national picture? Will the State's supply of growing stock, which increased by 5 percent between 1959 and 1972, continue to increase and if so, for how long? Will the present condition of growth exceeding removals by 6 percent be maintained? And will softwoods, which make up only 6 percent of the 1972 growing-stock volume, increase their proportion of total volume appreciably? The remainder of this section of the report seeks to suggest possible answers to these and other questions by a closer look at computer-generated projections of Missouri's timber resource 30 years into the future.

These projections were of two kinds--one assumes a low level of future timber removals, reflecting recent trends, and the other assumes a high level of removals, reflecting a departure from these trends. Assumed removals for both sets of projections were prepared for individual timber products, then summed. Separate projections were made for softwoods and for hardwoods. A stand projection technique[22] was used involving input of number of trees, radial growth, mortality rates, and removal rates, all by 2-inch diameter classes, along with assumed total removals by year and assumed ingrowth into the 2-inch d.b.h. class.

Assumptions common to both low and high option projections include: (1) the total area of commercial forest land will decline at an annual rate of 0.217 percent or 27,000 acres per year, compared to an annual rate of 0.809 percent or 111,812 acres per year from 1959 to 1972; (2) radial growth as estimated from measurement of permanent plots during the last two surveys will decline over time in relation to the increase of basal area per acre of trees; (3) the intensity of forest management practiced will continue at the rate indicated by recent trends; (4) that use of both softwoods and hardwoods for pulpwood will increase, but use of softwoods will increase at a faster rate; and (5) that the volume of "other" removals will drop during the period as more of these trees are utilized.

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[20] *USDA Forest Service. 1973. The outlook for timber in the United States. For. Resour. Rep. 20, 367 p.*

[21] *Other projections were based on the assumptions that (1) 1970 wholesale prices of timber products relative to average wholesale prices of all commodities and to most competing materials would remain at 1970 levels, and (2) that relative wholesale prices of timber products would rise from the 1970 trend level through the projection period much as in the past.*

[22] *USDA Forest Service. 1970. TRAS, a computer program for the projection of timber volume. U.S. Dep. Agric., Agric. Handb. 377, 24 p.*

Low Removals Option Projection

The low option projection assumes that softwood removals will increase at an average annual rate of 1.93 percent from 8.3 million cubic feet in 1972 to 13.1 million cubic feet in 2002, and that hardwood removals will remain virtually constant at 160.0 million cubic feet throughout the projection period. Total removals are projected to be lower in every year of the period than for the high option and, as a result, growth and inventory volumes are projected to go higher.

This projection shows growth rising slightly from 177 million cubic feet in 1972 to 179 million cubic feet in 2002 (fig. 12). During the last decade of the period the growth curve is almost flat. Timber removals are projected to increase at a somewhat faster rate than growth, rising from 168 million cubic feet in 1972 to 173 million cubic feet in 2002. Removals remain lower than growth throughout the period, although the two curves tend toward one another during the last 2 decades.

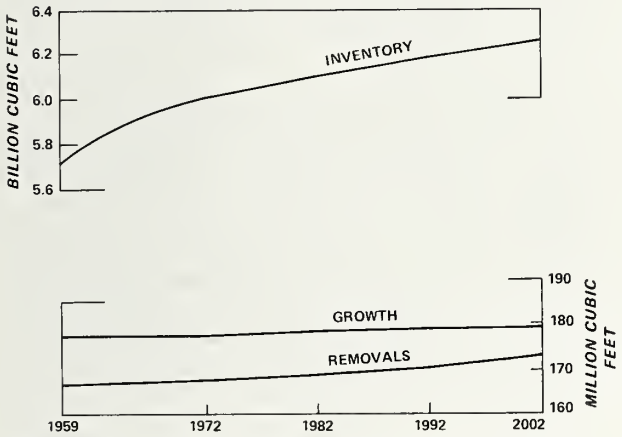

Figure 12.--*Removals, net growth, and inventory of growing stock in Missouri, 1959 and 1972, and low removals option projections for 1982-2002.*

Growing-stock inventory would build up under the above condition of an excess of growth over removals from 6.0 billion cubic feet in 1972 to 6.3 billion cubic feet in 2002. The inventory curve begins to flatten out in response to the converging growth and removals volumes in the last 2 decades of the period.

When the growing-stock projections of softwoods and hardwoods are observed separately, important differences are visible: the volume of softwood growth is projected to increase 22.1 percent between 1972 and 2002, but the volume of hardwood growth is projected to decline 0.5 percent during the same period. The softwood growth rate in 1972 was 3.6 percent of inventory and is projected to fall off to 3.1 percent of inventory in 2002. The 1972 hardwood growth rate was a somewhat lower 2.9 percent of inventory and is projected to dip only to 2.8 percent in 2002. Softwoods, with their higher growth rates, are projected to have a larger proportion of the total volume of growth--7.4 percent of the total in 1972 and 8.9 percent in 2002. Softwood removals are projected to increase 57.8 percent between 1972 and 2002, but hardwood removals are only projected to increase 0.4 percent. Softwoods amounted to 4.9 percent of the 1972 total removals volume but are projected to constitute 7.6 percent of the 2002 removals. Softwoods will comprise a slightly higher proportion of growing-stock inventory also, increasing from 6.1 percent of the total in 1972 to 8.2 percent in 2002.

High Removals Option Projection

Under the high removals option it is assumed that softwood growing-stock removals will double, from 8.3 million cubic feet in 1972 to 16.6 million cubic feet in 2002, for an average annual rate of increase of 3.3 percent. Hardwood removals are assumed to advance modestly from 159.4 million cubic feet in 1972 to 180.0 million cubic feet in 2002, a 0.4 percent average annual rate of increase. Total removals are higher throughout the projection period than for the low removals option. Total removals are projected to exceed growth by about 1990 and, as a consequence, growing-stock inventory is projected to turn down immediately after that date (fig. 13).

Growth rises slightly during the first decade of this projection, then declines slightly for the remainder of the period. Growth, which was 177 million cubic feet in 1972, is projected to advance to 178 million cubic feet in 1982 then to sag to 176 million cubic feet in 2002. Timber removals, which

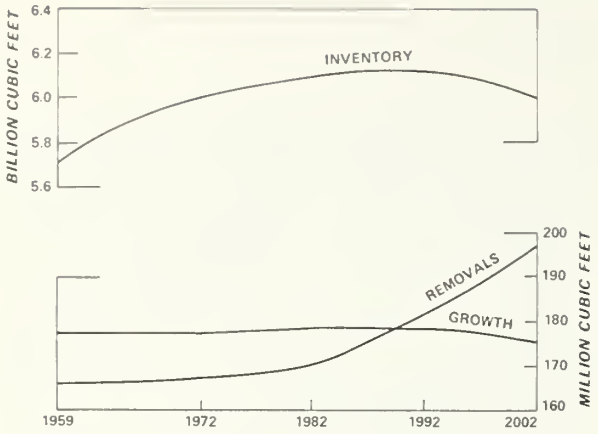

Figure 13.--*Removals, net growth, and inventory of growing stock in Missouri, 1959 and 1972, and high removals option projections for 1982-2002.*

had only a minimal impact on projected growth, are projected to rise throughout the period, modestly during the first decade and more sharply during the last 2 decades. Removals are projected to progress from 168 million cubic feet in 1972 to 197 million cubic feet in 2002, a 17 percent gain.

Inventory of growing stock is projected to increase at a slower rate each year until 1990, when removals are projected to exceed growth, then decline. The 1972 inventory of 6.0 billion cubic feet would rise to 6.1 billion cubic feet in 1990 and fall back to 6.0 billion cubic feet by 2002.

Significant differences between the softwoods and the hardwoods projection are evident upon close scrutiny, just as in the case of the low removals option. The volume growth on softwoods is projected to increase 16.8 percent between 1972 and 2002 (22.1 percent for the low option), but growth on hardwoods is projected to decline by 2.4 percent (0.5 percent for the low option) during the same period. Softwoods are projected to account for a somewhat larger proportion of the volume of growth at the end of the period than at the beginning: from 7.4 percent in 1972 to 8.7 percent in 2002. Softwood removals are projected to increase 100 percent during the period (57.8 percent for the low removals option), but hardwood removals are projected to increase only 12.9 percent (0.4 percent for the low option). Under this option softwoods would substantially increase their share of the total removals volume, from 4.9 percent of the 1972 removals to 8.4 percent of the removals in 2002. Growing-stock inventory would also be weighted somewhat more heavily to softwoods in 2002 (7.7 percent) than in 1972 (6.1 percent).

What Do the Projections Mean?

These two projections--the low and high removals options--probably set the upper and lower limits of the timber situation in Missouri for the next 30 years. The actual situation probably can be expected to fall somewhere between the two. Because there are many unforeseen elements in the mix of economic relations that will determine the actual future level of timber removals, the projections are most meaningful for the first decade.

Several conclusions can be drawn for the projections: first, the State's timber resource will remain overwhelmingly hardwood despite some increase in softwood inventory. Therefore, Missouri will figure only minimally in the efforts to abate the Nation's coming softwood roundwood shortage mentioned earlier.

Second, growing-stock inventory will remain very close to its 1972 volume. Timber removals were only slightly lower than growth in 1972. Thus if removals follow recent trends, only a slight inventory gain is possible and, as seems more likely, if removals increase, they cannot increase much without surpassing growth and triggering a turn-down of inventory unless the lowered stand basal area results in substantially lower mortality.

Third, the total volume of growth is not expected to increase significantly under the present level of forest management assumed for the next 30 years. In States like Missouri in which 87 percent of the commercial forest area is privately owned and the volume of timber harvested annually is determined by the forces of supply and demand in the marketplace and the unrelated decisions of many individual landowners, the annual volume of growth becomes an important guide to planners and others concerned with the statewide level of removals that can be sustained. If growth

does not increase, the opportunity for removals to increase without causing a reduction in timber supplies, is diminished.

Other changes will be wrought in the State's forests that are more difficult to predict. For instance, the extent of future clearing of commercial forest land for pasture and cropland can only be guessed, yet it is an important variable in the forest situation equation. The degree of success of the Forestry Incentives Act or other programs to elicit active and prolonged participation in forest management activities from the State's numerous private landowners is similarly unquantifiable. However, the participation of the private landowner is crucial to real improvement of Missouri's forests.

The level of forest management in the future will likely rise, although the projections discussed above assumed no change from recent trends. To the extent that forest management intensifies, the projections will prove to be conservative. Cultural work probably will be more widespread in the future, including release of light-demanding oak and hickory seedlings from their more shade-tolerant competitors in order to reproduce oak-hickory stands. Thinning also should be more prevalent, serving to maintain fast growth rates on sawtimber crop trees and to keep stands in healthy vigorous condition, the better to withstand insect and disease attacks. More of the pines planted in the future will be raised from seeds collected from genetically superior trees.

The developing public interest in the environment, the growing awareness that wild land is a precious and shrinking resource, the burgeoning demand for outdoor recreation, and the energy crisis all will also have far-reaching impacts on the management of Missouri's forests.

FOREST MANAGEMENT OPPORTUNITIES

Public interest is currently high in exploring opportunities for increasing supplies of timber nationally at a time when the future promises higher demands for timber products concurrent with a diminishing commercial forest area. The Forest and Rangeland Renewable Resources Planning Act of 1974 (PL 93-378) gave impetus to such interest. This law directs the Secretary of Agriculture to collect, analyze, and report information about the renewable resources of the Nation's forest, range, and related lands that would be useful in determining how best to meet the needs of the country for goods and services obtainable from renewable resources on these lands. One objective of the law is to identify and evaluate renewable resource investment opportunities in order that those yielding the most meaningful social and economic benefits can be accomplished first with the limited resources available for such investments.

The forest management opportunities presented in this section of the report are much less detailed and less comprehensive than those envisioned in PL 93-378. However, they do provide an estimate by broad treatment classes of the area that could be treated in order to improve or expand the State's forest resources.

Before proceeding with a discussion of opportunities for future treatment, it is useful to consider the kind and extent of vegetative change that has occurred in the recent past. Today's forest is a product of past actions taken and natural occurrences in an earlier forest.

Remeasurement in 1972 of permanent sample plots established in 1959 permitted an estimate of the type of vegetation modification on lands other than national forests during the 13-year period between surveys. These estimates are shown for each forest type in table 10.

Timber Harvesting Most Extensive Past Treatment

Three-fourths of the commercial forest land in other than national forest ownership showed no treatment or significant change between surveys. Timber harvesting was the dominant treatment, occurring on 2.2 million acres (20 percent of the commercial area). Harvesting includes partial cutting and clearcutting with or without subsequent artificial regeneration. Natural regeneration occurred on 302 thousand acres (3 percent of the area). Much of this area was land classed as cropland or pasture (nonforest land) in 1959 but which became sufficiently stocked with trees by 1972 to be classed as commercial forest. A higher proportion of the eastern redcedar (31 percent) and eastern redcedar hardwood (20 percent) forest types resulted from natural

Table 10.--*Area of commercial forest land in 1972 by forest type and type of treatment or change since 1959, all owners except National Forest, Missouri*

(In thousand acres)

Forest type	Total	Treatment or change						
		No change	Harvest	Natural regeneration	Timber stand improvement	Physiographic change	Stand conversion	Planted or seeded
Shortleaf pine	11.0	9.2	1.0	0.8	--	--	--	--
Eastern redcedar	79.1	54.6	--	24.5	--	--	--	--
E. redcedar-hardwood	197.0	117.2	23.0	40.0	--	14.3	2.5	--
Shortleaf pine-oak	108.8	64.4	40.2	--	2.1	--	2.1	--
Post-blackjack oak	2,444.6	1,954.1	396.3	37.7	20.5	36.0	--	--
Black-scarlet oak	3,771.1	2,828.8	836.6	52.0	25.3	12.3	16.1	--
White oak	2,372.8	1,830.5	497.8	17.3	11.9	--	4.7	10.6
Oak-gum-cypress	177.7	146.4	31.3	--	--	--	--	--
Elm-ash-cottonwood	651.3	499.3	127.5	15.8	7.5	--	--	1.2
Cottonwood	4.8	4.8	--	--	--	--	--	--
Maple-beech	310.8	196.6	71.0	43.2	--	--	--	--
Nonstocked	913.9	591.4	189.3	70.5	51.9	5.1	5.7	--
Total	11,042.9	8,297.3	2,214.0	301.8	119.2	67.7	31.1	11.8

regeneration between surveys than for any other type. Timber stand improvement and artificial regeneration were carried out on 131 thousand acres (1 percent) of the area. The physiographic change that occurred on 68 thousand acres is largely the result of land being drained sufficiently by 1972 to be classed commercial forest land after being classed as noncommercial forest land (unproductive) in 1959 by virtue of being underwater or otherwise too moist to grow commercial tree crops. Stands were converted from one forest type to another on 31 thousand acres.

Information similar to the above for all forest types on the 1,321.8 thousand acres of national forest land was provided by the National Forests in Missouri and is shown in the following tabulation:

Treatment	*Area* (Thousand acres)
No change	402.8
Harvest	527.4
Planting and seeding	57.7
Site preparation	41.2
Release and thinning	292.3
Pruning	0.4
Total	1,321.8

Opportunities for Future Treatment

Future treatment opportunity estimates are based on physical rather than economic criteria and were made from annual managed harvest information. As mentioned earlier, and in more detail in the Appendix, annual managed harvest in Missouri was determined by computer using an area control system for computing the number of acres to be treated each year. Stands to be harvested were selected because their site index and age indicated they were now or would within 10 years be at rotation age. Stands selected for thinning were those not yet ready for harvest and overstocked by basal area standards now or prospectively within 10 years. Because the computer first schedules rough and rotten trees, then short-log trees, and finally, growing-stock trees to be "removed" from stands to be thinned, the estimate of area to be treated is that for thinning and cull tree removal combined. Estimates of the area that could be treated by stand conversion or regeneration were also made from computer-generated managed harvest information. These estimates were broken into that from nonstocked commercial forest land, from sparsely stocked[23] commercial forest land, and from nonforest land. Acres to be harvested are not included because these areas are assumed to be regenerated immediately following logging.

[23] *Stands in which stocking in relation to age of the stand is so low that they are not expected to reach a level of stocking adequate for commercial timber production by rotation age.*

Treatments for commercial forest land are based on biological or silvicultural standards that must be met by individual stands, and represent the sum of treatment opportunities between 1972 and 1981. On the other hand, the area of nonforest land shown in the stand conversion and regeneration column in table 11 is the total area of idle cropland and wooded pasture in the State. An unknown but probably very small amount of this nonforest land will be converted or regenerated to forest by 1981. Most of these lands will return to agricultural production, be developed for uses other than timber production, or remain as they are. Nevertheless, the areas of idle cropland and wooded pasture are included in table 11 because reversion of these lands to forest is essentially the only way to expand the commercial timber base or to maintain it in the face of continuing diversions to other uses (fig. 14).

No Treatment Needed on Two-Fifths of Commercial Area

According to the criteria described above, 5.3 million acres of commercial forest need no treatment (table 11). These stands are immature and are satisfactorily stocked with trees without being overstocked. Thus, these stands are likely to make adequate growth for at least the next decade without man's intervention. This is not to say, however, that these stands could not profit from some kinds of treatment other than those shown in table 11. For instance, fertilization could increase the growth rate of some stands, and pruning could improve the quality of sawtimber trees for some timber products.

A higher proportion of the area of softwood forest types (59 percent) need no treatment than do hardwood types (41 percent).

Table 11.--*Area of nonforest land and of commercial forest land by forest type and class of treatment needed for the decade 1972 to 1981, Missouri*

(In thousand acres)

Land class and forest type	Total area	Class of treatment needed					
		No treatment needed on commercial forest land	Harvest on commercial forest land	Thinning and cull tree removal on commercial forest land	Stand conversion or regeneration: On non-stocked commercial forest land	Stand conversion or regeneration: On sparsely stocked commercial forest land[1/]	Stand conversion or regeneration: On nonforest land
Nonforest land:							
Idle cropland	193.0	0	0	0	0	0	193.0
Wooded pasture	2,803.1	0	0	0	0	0	2,803.1
Subtotal	2,996.1	0	0	0	0	0	2,996.1
Commercial forest land[2/]							
Shortleaf pine	116.0	57.6	20.6	37.8	--	--	0
Eastern redcedar	88.3	66.9	13.6	--	--	7.8	0
E. redcedar-hardwood	296.8	150.1	39.7	5.7	37.4	63.9	0
Shortleaf pine-oak	281.1	188.5	53.8	24.2	--	14.6	0
Post-blackjack oak	2,770.9	1,185.3	493.1	--	282.7	809.8	0
Black-scarlet oak	4,620.9	1,907.0	711.3	747.9	211.5	1,043.2	0
White oak	2,785.9	1,270.0	471.9	235.3	141.4	667.3	0
Oak-gum-cypress	205.7	71.3	26.7	44.7	28.0	35.0	0
Elm-ash-cottonwood	755.5	251.0	121.3	184.7	94.9	103.6	0
Cottonwood	4.8	3.2	1.6	--	--	--	0
Maple-beech	438.8	102.7	31.9	50.3	128.0	125.9	0
Subtotal	12,364.7	5,253.6	1,985.5	1,330.6	923.9	2,871.1	0
Total	15,360.8	5,253.6	1,985.5	1,330.6	923.9	2,871.1	2,996.1

1/ Stocking in relation to age of the stand is so low that the stand is not expected to reach a level of stocking adequate for commercial timber production by rotation age.

2/ Nonstocked area is distributed into each forest type.

Figure 14.--*Machine-planting shortleaf pine on formerly nonforest land. Planting, seeding, or natural regeneration of idle cropland are ways that the decline of commercial forest area can be countered. (Photo courtesy of Missouri Department of Conservation.)*

This arises from the relative youth of many softwood stands. Two-thirds of the shortleaf pine-oak stands and three-fourths of the eastern redcedar stands need no treatment.

One-third of Area Lacks Adequate Tree Stocking

A total of 3.8 million acres of commercial forest land (31 percent of the total) are either nonstocked or so sparsely stocked as to require stand conversion and/or artificial regeneration to produce a manageable stand. Nonstocked areas account for 0.9 million acres and sparsely stocked stands for the remaining 2.9 million acres. Many of these stands were logged, burned, or otherwise disturbed in the past and did not regenerate to trees before a stand of grass, perennial weeds, shrubs, or brush became established. Livestock grazing on some of these areas after the primary disturbance probably prevented some areas from returning to trees. Some nonstocked and sparsely stocked stands are at the low end of the site-quality scale.

The largest area that could benefit from stand conversion or regeneration on nonstocked land is in the Prairie Unit (0.3 million acres). Largest areas of sparsely stocked commercial forest needing treatment are in the Eastern Ozarks Unit (0.8 million acres) and in the Northwestern Ozarks Unit (0.7 million acres). If the 3.0 million acres of nonforest land are included, a maximum of 6.8 million acres could be converted or regenerated.

Only 16 percent of the area of softwood forest types is in the nonstocked or sparsely stocked classes as compared to 32 percent of

the hardwood types. None of the 116 thousand acres of the shortleaf pine type (much of which is in plantations) are in these classes, and only 5 percent of the shortleaf pine-oak and 9 percent of the eastern redcedar types are so classed. Among hardwood types, the maple-beech type contains the largest proportion of area (58 percent) in need of conversion or regeneration. Some of this area is on sites where Dutch elm disease-killed elms were a large component of the stand. Other sites are marginal for producing average or better quality sugar maple and other species associated with the type, and would be better suited to growing different species, perhaps shortleaf pine. The post-blackjack oak type, with 39 percent of its area nonstocked or sparsely stocked, ranks second in proportion of area in this class. Generally speaking, this type occupies the poorer sites in the State--soils that are shallow, dry, stoney, and often located on ridgetops or upper slopes. Trees associated with this type are often too small to be used for high value forest products such as saw logs, suggesting that some sites might be better utilized if they were converted to pine or, on extremely poor sites, perhaps to pasture.

The acres shown as nonstocked or sparsely stocked are a realistic estimate of the area on which a manageable stand is not present now or in the foreseeable future with natural plant succession. Ideally, some kind of treatment is called for, but pragmatically, none is possible now on many acres for economic or technical reasons. Some poor hardwood sites can be converted to shortleaf pine, and this is the only species with which planting is contemplated in the near future. Obviously, planting those sites too poor to grow merchantable crops of pine is not practical. Most hardwood sites on which advance hardwood reproduction is missing at the time of logging or disturbance are extremely difficult to regenerate to desirable hardwoods. Oaks can be planted on suitable sites[24] but the cost of subsequent cultural operations needed to remove competition from the oak seedlings is prohibitive, making oak planting a marginal investment at present. Little is known of the technical or economic requirements for planting or seeding other hardwood species. Therefore, many nonstocked and sparsely stocked hardwood sites will probably remain so for the immediate future.

[24] *Russell, T. E. 1971. Seeding and planting upland oaks. In Oak Symp. Proc., Morgantown, W. Virginia, Aug. 16-20, 1971: p. 49-54. Northeast. For. Exp. Stn., Upper Darby, Pa.*

Timber Harvest is Appropriate Treatment on One-sixth of Area

Stands whose site index and age indicate they are ready for harvest or will be ready within the next decade total 2.0 million acres (fig. 15). The largest area of stands ready for harvest is in the Eastern Ozarks Unit (0.7 million acres) followed by the Southwestern Ozarks Unit (0.4 million), the Riverborder Unit (0.4 million), the Northwestern Ozarks Unit (0.3 million), and the Prairie Unit (0.2 million).

Even-aged management is anticipated, and the harvest area is the area of final harvest or reproduction cut. The area of intermediate cuts is included under the category, "thinning and cull tree removal." Regeneration of these harvested acres is assumed to occur soon after logging, either naturally or by artificial means. Therefore, none of this area is included in the class of treatment, "stand conversion or regeneration."

There is no difference between softwoods and hardwoods in the proportion of area of each in the harvest class--both equal 16 percent of their totals. The largest area in the harvest category is the black-scarlet oak type with 711 thousand acres (36 percent of the total harvest area).

The acres designated for harvest are based on silvicultural considerations rather than management or economic ones. Some of the area will not be available for harvest because of owner preference, and some may not be accessible because of difficult terrain or attendant road construction problems. However, harvest and prompt regeneration of these mature and overmature stands represents a major opportunity to increase the future supply of timber in the State.

One-tenth of Area Overcrowded with Young Trees

Stands that are both immature and overstocked exist on 1.3 million acres of commercial forest (11 percent of the total). These stands are those classed in need of thinning and cull-tree removal in order to control spacing, improve species composition, release desirable trees, and accelerate growth.

Figure 15.--*Sixteen percent of the commercial forest is ready for harvest, based on the criteria of stand age and site index. (Photo courtesy of the Missouri Department of Conservation.)*

More stands in need of thinning are found in the Eastern Ozarks Unit (0.6 million acres) than in any other Unit, followed by the Prairie Unit (0.3 million), the Southwestern Ozarks Unit (0.2 million), the Riverborder Unit (0.1 million), and the Northwestern Ozarks Unit (0.1 million).

The proportion of softwoods (9 percent) in this treatment class is somewhat smaller than that of hardwoods (11 percent). However, the shortleaf pine type boasts the highest proportion of all types in need of intermediate cutting with 33 percent. Much of this area is in shortleaf pine plantations that are advanced enough to benefit from thinning. None of the eastern redcedar or post-blackjack oak types were found to fit the criteria for this treatment class.

As with the other treatment classes, if economic considerations were imposed in the process of selecting acres to be treated, the area of thinning and cull tree removal probably would be substantially reduced. For some stands, especially those on poorer sites, thinning will remain--for the immediate future at least--an economically unfeasible investment because of limited growth response or lack of markets.

Landowners who wish to consider forest management opportunities on their own lands in greater detail will find professional advice available from Missouri Department of Conservation Service Foresters (fig. 16). Addresses and phone numbers of the State's Service Foresters are available from: Missouri Department of Conservation, 2901 North Ten Mile Drive, P.O. Box 180, Jefferson City, Missouri 65101.

Figure 16.--*A Missouri Department of Conservation Service Forester discusses the growth of a shortleaf pine with a landowner. (Photo courtesy of Missouri Department of Conservation.)*

APPENDIX

Accuracy of Survey

Forest Survey information is based on a sampling procedure designed to provide reliable statistics at the State and Survey Unit levels. Consequently, the reported figures are estimates only. However, a measure of reliability of these figures is given by sampling errors. These sampling errors may be interpreted as meaning that the chances are two out of three that the results for the sample differ, by no more than the amount indicated, from the results that would have been obtained if all trees in the State had been measured (a 100-percent inventory), using the same tree measurements.

For example, the estimated area of commercial forest land in the State in 1972, 12,364.7 thousand acres, has a sampling error of ± 0.78 percent (±96.4 thousand acres). The chances are two out of three, then, that the commercial forest area falls between 12,268.3 and 12,461.1 thousand acres (12,364.7 ± 96.4), the limits within which the results of a 100-percent inventory would occur.

Item	*State totals*	*Sampling error*[25] (Percent)
Growing stock:		
Volume	6,001.5 MM cubic feet	1.54
Growth	177.3 MM cubic feet	2.19
Removals	167.7 MM cubic feet	4.18
Sawtimber:		
Volume	15,054.9 MM board feet	2.17
Growth	363.5 MM board feet	3.01
Removals	542.0 MM board feet	7.58
Commercial forest land	12,364.7 M acres	0.78

As survey data are broken down into units smaller than State or Survey Unit totals, the sampling error increases. The smaller the breakdown, the larger the sampling error. For example, the sampling error for area of commercial forest land in a particular county is much higher than that for total commercial area in the State. An approximation of the increasing sampling error can be obtained from table 12, which shows the sampling errors associated with estimates smaller than totals in Missouri.

[25] *At the 68-percent probability level.*

Survey Procedure

The major steps in the Missouri survey were as follows:

1. A total of 215,977 points (small circles on a clear plastic overlay, each representing a ground area of 1 acre) were distributed systematically across aerial photos of the entire State. These points were observed and classified as either forest land (72,745) or nonforest land (143,232) in order to make a preliminary estimate of forest area. Next, 28,004 of the forest points were stereoclassified as to forest type, stand-size class, and density. Then 3,555 of these 1-acre points classed as forest and 7,059 of them classed as nonforest were examined on the ground to correct the preliminary area estimate for errors in classification and for actual changes in land use since the photos were taken. Some of the points examined were locations of permanent sample plots (each of which contained one variable-radius plot with basal area factor five) established during the 1959 survey. Of the 2,914 points determined to be on commercial forest land from ground examination, 1,274 were at previously unsampled locations and 10-point variable-radius plots (basal area factor 37.5) were established uniformly over the sample acre. The remaining 1,640 points were at formerly established permanent plot locations and were remeasured by superimposing 10-point variable-radius plots (basal area factor 37.5) over the existing plot in addition to remeasuring the basal area factor five plot. Tree measurements made on new and remeasured plots were the basis for estimates of timber volume, growth, mortality, number of trees, and other forest classifications.

2. Statistics on timber utilization in 1969 were obtained from mill surveys and from remeasurement of permanent sample plots. The Missouri Department of Conservation canvassed resident sawmills, veneer mills, and other primary wood-using plants. The North Central Forest Experiment Station canvassed resident pulpmills, and the underground mining industry in Missouri, as well as out-of-State sawmills, pulpmills, and veneer mills to determine their use of timber from Missouri. Fuelwood and fencepost output was based on U.S. Census of Agriculture and Housing figures, a canvass of public and industrial timber owners, and a canvass of resident wood-treating plants. Estimates of primary mill residue used for fuelwood were obtained from the canvass

Table 12.--*Sampling errors*[1] *for estimates smaller than State totals of volume, net growth and removals, and of area of commercial forest land in Missouri, 1972*

Sampling error	Commercial forest	Growing stock			Sawtimber		
		Volume	Growth	Removals	Volume	Growth	Removals
(Percent)	Thousand acres	Million cubic feet			Million board feet[2]		
1	7,467.1	14,212.9	853.6	2,930.1	71,068.3	3,297.5	31,142.3
2	1,866.8	3,553.2	213.4	732.5	17,767.1	824.4	7,785.6
3	829.7	1,579.2	94.8	325.6	7,896.5	366.4	3,460.3
4	466.7	888.3	53.3	183.1	4,441.8	206.1	1,946.4
5	298.7	568.5	34.1	117.2	2,842.7	131.9	1,245.7
10	74.7	142.1	8.5	29.3	710.7	33.0	311.4
15	33.2	63.2	3.8	13.0	315.9	14.7	138.4
20	18.7	35.5	2.1	7.3	177.7	8.2	77.9
25	11.9	22.7	1.4	4.7	113.7	5.3	49.8
50	3.0	5.7	0.3	1.2	28.4	1.3	12.5
100	0.7	1.4	0.1	0.3	7.1	0.3	3.1

1/ At the 68-percent probability level.
2/ International 1/4-inch rule.

of Missouri primary wood-using plants. Timber cut for products by owner class was determined by a canvass of all public and industrial timber owners. The portion of timber cut unaccounted for by the latter owners was grouped under "farmer and other owners."

3. To develop wood utilization factors used in converting timber products output to timber removals for saw logs, veneer logs, cooperage logs, pulpwood, and charcoal wood, 486 felled trees throughout the State were measured. Factors for all other products were obtained during the 1959-1960 Missouri utilization study.

4. Field data were sent to St. Paul where they were edited, punched on cards, and stored on magnetic tape for later machine sorting, computing, and tabulation.

Managed Harvest

Managed harvest is the estimated volume of timber on commercial forest land that could be cut annually for the next 10 years, while improving tree stocking and bringing about a more even distribution of age classes. In Missouri, annual managed harvest is shown separately from harvest cutting and from thinnings, and was determined by computer using an area control system for determining the number of acres to be cut annually.

The harvest cut of sawtimber was calculated from stands of forest types normally managed for sawtimber whose site index and age indicated they were ready for harvest, or would be within the next 10 years. Table 13 shows the site index used in these calculations for each forest type to determine whether the objective of management would be to grow sawtimber or pulpwood. Included also is the rotation age for each.

Stands that did not qualify for harvest during that period were checked to see if they were overstocked by basal area standards, or would be within the next 10 years. Stands determined to be overstocked were "thinned" by the computer back to their recommended basal-area stocking level, and the volume of sawtimber trees "thinned" was added to the volume of allowable cut by thinnings of growing stock and sawtimber. The volume of poletimber trees "thinned" was added to the growing-stock allowable cut by thinnings. In scheduling thinnings, the computer program first "removes" rough and rotten trees, then short-log trees, and finally, growing-stock trees. The volume of allowable cut from rough, rotten, and short-log (rough) trees is kept separate from that from growing-stock trees.

The harvest cut of growing stock included that of sawtimber in addition to the volume from stands of forest types normally managed for pulpwood that were or would be rotation age within the next 10 years.

Table 13.--*Forest type, site index, and rotation age by management objective used in calculation of managed harvest, Missouri, 1972*

Forest type	Site index[1]	Rotation age[1]	Management objective
		Years	
Shortleaf pine	50 or higher	60	Sawtimber
	Less than 50	40	Pulpwood
Shortleaf pine-oak	60 or higher	80	Sawtimber
	Less than 60	50	Pulpwood
Eastern redcedar	35 or higher	55	Sawtimber
	Less than 35	70	Sawtimber
E. redcedar-hardwood	45 or higher	50	Sawtimber
	Less than 45	60	Sawtimber
Black-scarlet oak	60 or higher	80	Sawtimber
	Less than 60	50	Pulpwood
White oak	60 or higher	80	Sawtimber
	Less than 60	50	Pulpwood
Post-blackjack oak	All sites	50	Pulpwood
Oak-gum-cypress	All sites	60	Sawtimber
Cottonwood	All sites	30	Sawtimber
Elm-ash-cottonwood	All sites	50	Sawtimber
Maple-beech	All sites	90	Sawtimber

[1]Recommended by timber management researchers.

Managed harvest is based on the assumptions that all timber will be available and accessible when needed, and that a ready market will exist for every species, size, and grade of material harvested. Further, it assumes that the proper sequence of cutting is known and will be followed, and that logging practices employed will result in an improved forest. Because there is no way of guaranteeing that these assumptions will be carried out during the next 10 years, the allowable cut estimates should be compared with timber removals figures only in a general way.

Log Grade

In Missouri the butt log of every sawtimber tree (6,962 trees) on every permanent sample plot was graded for quality. Additionally, all of the logs in a smaller sample of trees throughout the State (265 trees) were graded. The volume yield by log grade for each tree in the latter sample was used to distribute the volume of trees in the former sample into log-grade classes. The resulting volumes by log-grade classes were expanded to provide an estimate for the entire State.

Logs were graded on the basis of external characteristics as indicators of quality. Hardwood species were graded according to "Hardwood Log Grades for Standard Lumber and How To Use Them" published by the Forest Products Laboratory under the designation D1737A, 1961, and USDA Forest Service standards for hardwood tie and timber logs. The best 12-foot section of the lowest 16-foot hardwood log, or the best 12-foot upper section if the butt log did not meet minimum log-grade standards, was graded.

Shortleaf pine was graded according to "Interim Southern Pine Log Grades," USDA Forest Service, 1953. All other softwoods were graded according to "Specifications for Log Grades of Hardwoods and Softwoods," Northern Hemlock and Hardwood Association, 1947. The lowest 16-foot log in softwood trees or a shorter log down to 12 feet if a 16-foot butt log was not present, was graded.

Definition of Terms

Land-Use Classes

Gross area.--The entire area of land and water as determined by the Bureau of Census, 1960.

Land area.--The area of dry land and land temporarily or partially covered by water such as marshes, swamps, flood plains, streams, sloughs, and estuaries. Canals less than 1/8-mile wide, and lakes, reservoirs, and ponds smaller than 40 acres are included as land area. These figures are from the Bureau of Census, 1960.

Forest land.--Land at least 16.7 percent stocked by forest trees of any size, or formerly having such tree cover, and not currently developed for nonforest use. Includes afforested areas. The minimum forest area classified was 1 acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width of at least 120 feet to qualify as forest land. Unimproved roads and trails, streams, and clearings in forest areas were classed as forest if less than 120 feet in width.

Commercial forest land.--Forest land that is producing or is capable of producing crops of industrial wood and that is not withdrawn from timber utilization by statute or administrative regulation. This includes areas suitable for management to grow crops of industrial wood generally of a site quality capable of producing in excess of 20 cubic feet per acre of annual growth. This includes both inaccessible and inoperable areas.

Noncommercial forest land.--(a) Unproductive--forest land incapable of yielding crops of industrial wood because of adverse site conditions, (b) Productive-reserved--forest land withdrawn from commercial timber use through statute or administrative regulation, or exclusively used for Christmas tree production.

Nonforest land.--Land that has never supported forests, and land formerly forested where forest use is precluded by development for nonforest uses, such as cropland, improved pasture, residential areas, and city parks. Also includes improved roads and adjoining rights-of-way, powerline clearings, and certain areas of water classified by the Bureau of Census as land. Unimproved roads, streams, canals, and nonforest strips in forest areas must be more than 120 feet wide, and clearings in forest areas must be more than 1 acre in size, to qualify as nonforest land.

Ownership Classes

National forest.--Federal lands that have been designated by executive order or statute as national forests or purchase units, and other lands under the administration of the USDA Forest Service.

Other Federal.--Federal lands other than national forest.

State, county, and municipal.--Lands owned by States, counties, or local public agencies, or lands leased by them for more than 50 years.

Forest industry.--Lands owned by companies or individuals operating primary wood-using plants.

Farmer-owned.--Lands owned by operators of farms. A farm must include 10 or more acres from which the sale of agricultural products totals $50 or more annually, or if less than 10 acres, the yield must be at least $250 annually.

Miscellaneous private.--Privately owned lands other than forest industry- or farmer-owned.

Tree Classes

All live trees.--Growing-stock, rough and rotten trees 1 inch d.b.h. and larger.

Growing-stock trees.--All live trees of commercial species except rough and rotten trees.

Desirable trees.--Growing-stock trees having no serious defects in quality limiting present or prospective use, and of relatively high vigor and containing no pathogens that may result in death or serious deterioration before rotation age. These are trees that would be favored by forest managers in silvicultural operations.

Acceptable trees.--Trees meeting the standards for growing stock but not qualifying as desirable trees.

Sawtimber trees.--Growing-stock trees of commercial species containing at least a 12-foot saw log or two noncontiguous saw logs, each 8 feet or longer. At least 33 percent of the gross volume of the tree must be sound wood. Softwoods must be at least 9.0 inches d.b.h. and hardwoods at least 11.0 inches.

Poletimber trees.--Growing-stock trees of commercial species at least 5.0 inches d.b.h. but smaller than sawtimber size, and of good form and vigor.

Saplings.--Live trees of commercial species 1.0 to 5.0 inches d.b.h. and of good form and vigor.

Seedlings.--Live trees of commercial species less than 1.0 inch d.b.h. that are expected to survive according to regional standards. (Examples of seedlings not expected to survive are those that are diseased or heavily damaged by logging, browsing, or fire). Only softwood seedlings over 6 inches and hardwood seedlings over 1 foot in height are counted.

Rotten trees.--Live trees (any size) of commercial species that do not contain a merchantable 12-foot saw log or two noncontiguous 8-foot or longer saw logs, now or prospectively, because of rot (that is, when more than 50 percent of the cull volume of the tree is rotten).

Rough trees.--Live trees that do not contain at least one merchantable 12-foot saw log or two noncontiguous 8-foot or longer saw logs, now or prospectively, because of roughness and poor form, as well as all live noncommercial species.

Short-log (rough trees).--Sawtimber-sized trees of commercial species that contain at least one merchantable 8- to 11-foot saw log but not a 12-foot saw log.

Stocking

The degree of utilization of land by trees as measured in terms of basal area and/or the number of trees in a stand compared to the basal area and/or number of trees required to utilize fully the growth potential of the land.

A stocking percent of 100 indicates full utilization of the site and is equivalent to 80 square feet of basal area per acre in trees 5 inches d.b.h. and larger. In a stand of trees less than 5 inches d.b.h., a stocking percent of 100 would indicate that the present number of trees is sufficient to produce 80 square feet of basal area per acre when the trees do reach 5 inches d.b.h.

Stocking of all live trees, growing-stock trees, and desirable trees are recorded separately and stands are grouped into the following stocking classes.

Stocking Classes

Overstocked stands.--Stands in which stocking of trees is 133 percent or more.

Fully stocked stands.--Stands in which stocking of trees is from 100 to 133 percent.

Medium-stocked stands.--Stands in which stocking of trees is from 60 to 100 percent.

Poorly stocked stands.--Stands in which stocking of trees is from 16.7 to 60 percent.

Nonstocked areas.--Commercial forest land on which stocking of trees is less than 16.7 percent.

Area-Condition Classes

Class 10.--Areas fully stocked with desirable trees but not overstocked.

Class 20.--Areas fully stocked with desirable trees, but overstocked with all live trees.

Class 30.--Areas medium to fully stocked with desirable trees, and with less than 30 percent of the area controlled by other trees and/or inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.

Class 40.--Areas medium to fully stocked with desirable trees and with 30 percent or more of the area controlled by other trees and/or conditions that ordinarily prevent occupancy by desirable trees.

Class 50.--Areas poorly stocked with desirable trees, but fully stocked with growing-stock trees.

Class 60.--Areas poorly stocked with desirable trees, but with medium to full stocking of growing-stock trees.

Class 70.--Areas poorly stocked with desirable trees, and poorly stocked with growing-stock trees.

Stand-Size Classes

Stand.--A growth of trees on a minimum of 1 acre of forest land that is stocked by forest trees of any size.

Sawtimber stands.--Stands at least 16.7 percent stocked with growing-stock trees, with half or more of this stocking in sawtimber or poletimber trees and with sawtimber stocking at least equal to poletimber stocking.

Poletimber stands.--Stands at least 16.7 percent stocked with growing-stock trees, and with half or more of this stocking in sawtimber and/or poletimber trees and with poletimber stocking exceeding that of sawtimber.

Sapling-seedling stands.--Stands at least 16.7 percent stocked with growing-stock trees and with saplings and/or seedlings comprising more than half of this stocking.

Nonstocked areas.--Commercial forest land on which stocking of growing-stock trees is less than 16.7 percent.

Other Classifications

Site index.--An expression of forest site quality based on the height of a free-growing dominant or codominant tree of a representative species in the forest type at age 50.

Site classes.--A classification of forest land in terms of inherent capacity to grow crops of industrial wood expressed in cubic-foot growth per acre per year.

Stand-age.--Age of the main stand. Main stand refers to trees of the dominant forest type and stand-size class.

Basal area.--The area in square feet of the cross section at breast height of a single tree. When the basal area of all the trees in a stand are summed, the result is usually expressed as square feet of basal area per acre.

Forest Types

A classification of forest land based upon the species forming a plurality of live-tree stocking. Major forest types in Missouri are:

Shortleaf pine.--Forests in which shortleaf pine comprises a plurality of the stocking. (Common associates include oak, hickory, and gum.)

Eastern redcedar.--Forests in which eastern redcedar comprises a plurality of the stocking. (Common associates include oak and hickory.)

Eastern redcedar-hardwood.--Forests in which hardwoods (usually upland oaks) comprise a plurality of the stocking but in which eastern redcedar comprises 25 to 50 percent of the stocking. (Common associates include gum, hickory, and yellow-poplar.)

Shortleaf pine-oak.--Forests in which upland oaks comprise a plurality of the stocking, but in which shortleaf pine comprises 25 to 50 percent of the stocking.

Post-blackjack oak.--Forest in which post oak or blackjack oak, singly or in combination, comprises a plurality of the stocking except where shortleaf pine or redcedar comprises 25 to 50 percent.

Black-scarlet oak.--Forests in which upland oaks or hickory, singly or in combination, comprises a plurality of the stocking except where shortleaf pine or redcedar comprises 25 to 50 percent, or where white oak or post and blackjack oak comprise a plurality. (Common associates include yellow-poplar, elm, maple, and black walnut.)

White oak.--Forests in which white oak and other white oak species, singly or in combination, comprise a plurality of the stocking except where shortleaf pine or redcedar comprises 25 to 50 percent.

Oak-gum-cypress.--Bottomland forests in which bottomland oaks such as pin, swamp white, and shingle oaks, along with tupelo, blackgum, sweetgum, and cypress, singly or in combination, comprise a plurality of the stocking. (Common associates include cottonwood, willow, ash, elm, hackberry, and maple.)

Elm-ash-cottonwood.--Forests in which elm, ash, or cottonwood, singly or in combination, comprises a plurality of the stocking. (Common associates include willow, sycamore, beech, and maple.)

Cottonwood.--Forests in which cottonwood comprises a plurality of the stocking.

Maple-beech.--Forests in which hard maple or beech, singly or in combination, comprises a plurality of the stocking. (Common associates include elm and basswood.)

Timber Volume

Volume of growing stock.--The volume of sound wood in the bole of growing-stock trees 5.0 inches d.b.h. and over, from a 1-foot stump to a minimum of 4.0-inch top diameter outside bark, or to the point where the central stem breaks into limbs. Growing-stock volumes are shown in cubic feet and cords. Conversion from one unit of measure to another may be accomplished by a factor of 79 cubic feet per solid wood cord.

Volume of sawtimber.--Net volume of the saw log portion of live sawtimber trees in board feet, International ¼-inch rule, from stump to a minimum 7 inches top diameter outside bark for softwoods and 9 inches for hardwoods.

Upper stem portion.--That part of the bole of sawtimber trees above the merchantable sawtimber top to a minimum top diameter of 4.0 inches outside bark or to the point where the central stem breaks into limbs.

Growth and Mortality

Net annual growth of growing stock.--Net annual growth of growing stock is the change in volume of sound wood that occurred during 1971 in growing-stock trees that were 5.0 inches d.b.h. or larger at the beginning of the year,

plus

the volume of sound wood in growing-stock trees smaller than 5.0 inches d.b.h. at the beginning of the year that grew sufficiently during the year to be reclassified into the 5.0-inch-or-larger d.b.h. classes (ingrowth),

plus

the volume of sound wood in trees that had been classified either as rough or rotten trees at the beginning of the year but were reclassified during the year as growing-stock trees,

plus

the annual change in volume of sound wood that occurred during the year on growing-stock trees that died during the year,

plus

the annual change in volume of sound wood that occurred in growing-stock trees included among timber removals for the year,

plus

the annual change in volume of sound wood in trees that had been classified as growing stock at the beginning of the year but were reclassified during the year as rough or rotten trees. Only the volume change that occurred during the portion of the years the trees were classified as growing stock was included,

minus

the volume of sound wood in growing-stock trees that died from natural causes during the year, and

minus

the volume of sound wood in trees that had been classified as growing stock at the beginning of the year, but were reclassified during the year as rough or rotten trees.

Net annual growth of sawtimber.--Net annual growth of sawtimber is the change in volume of sound wood that occurred during 1971 in trees that were sawtimber size at the beginning of the year,

plus

the volume of sound wood in growing-stock trees smaller than sawtimber size at the beginning of the year that grew sufficiently during the year to be reclassified as sawtimber trees (ingrowth),

plus

the volume of sound wood in trees that had been classified either as rough or rotten trees at the beginning of the year, but were reclassified during the year as sawtimber trees,

plus

the annual change in volume of sound wood that occurred during the year on sawtimber trees that died during the year,

plus

the annual change in volume of sound wood that occurred in sawtimber trees included among timber removals for the year.

plus

The annual change in volume of sound wood in trees that had been classified as sawtimber trees at the beginning of the year, but were reclassified during the year as rough or rotten trees. Only the volume change that occurred during the portion of the year the trees were classified as sawtimber was included,

minus

the volume of sound wood in sawtimber trees that died from natural causes during the year, and

minus

the volume of sound wood in trees that had been classified as sawtimber trees at the beginning of the year, but were reclassified during the year as rough or rotten trees.

Mortality of growing stock.--The volume of sound wood in growing-stock trees dying annually from natural causes. Natural causes include fire, insects, disease, animal damage, weather, and suppression.

Mortality of sawtimber.--The net board-foot volume of sawtimber trees dying annually from natural causes.

Timber Removals

Timber removals from growing stock.--The volume of sound wood in growing-stock trees removed annually for forest products (including roundwood products and logging residues) and for other removals. Roundwood products are logs, bolts, or other round sections cut and used from trees. Logging residues are the unused portions of cut trees plus unused trees killed by logging. Other removals are growing-stock trees removed but not utilized for products or trees left standing but "removed" from the commercial forest land classification by land use change--examples are removals from cultural operations such as timber stand improvement work, land clearing, and changes in land use.

Timber removals from sawtimber.--The net board-foot volume of live sawtimber trees removed for forest products annually (including roundwood products and logging residues) and for other removals.

Timber products output.--All timber products cut from roundwood, and byproducts of wood manufacturing plants. Roundwood products include logs, bolts, or other round sections cut from growing-stock trees, cull trees, salvable dead trees, trees on nonforest land, noncommercial species, sapling-size trees, and limbwood. Byproducts from primary manufacturing plants include slabs, edgings, trimmings, miscuts, sawdust, shavings, veneer cores and clippings, and screenings of pulpmills that are used as pulp chips or other products.

Plant byproducts.--Wood products, such as pulpwood chips, obtained incidental to production of other manufactured products.

Plant residues.--Wood materials from manufacturing plants not utilized for some product.

Principal Tree Species in Missouri[26]

SOFTWOOD SPECIES

Shortleaf pine . . . . . *Pinus echinata*
Baldcypress . . . *Taxodium distichum* var. *distichum*
Eastern redcedar . . . . . *Juniperus virginiana*

HARD HARDWOOD SPECIES

Ashes:
- White ash . . . . . *Fraxinus americana*
- Green ash . . . . . *Fraxinus pennsylvanica*
- Blue ash . . . . . *Fraxinus quadrangulata*

American beech . . . . . *Fagus grandifolia*

Black walnut . . . . . *Juglans nigra*

Hard maples:
- Black maple . . . . . *Acer nigrum*
- Sugar maple . . . . . *Acer saccharum*

Hickory group A:
- Pecan . . . . . *Carya illinoensis*
- Shellbark hickory . . . . . *Carya laciniosa*
- Shagbark hickory . . . . . *Carya ovata*
- Mockernut hickory . . . . . *Carya tomentosa*

Hickory group B:
- Water hickory . . . . . *Carya aquatica*
- Bitternut hickory . . . . . *Carya cordiformis*
- Pignut hickory . . . . . *Carya glabra* var. *glabra*
- Black hickory . . . . . *Carya texana*

River birch . . . . . *Betula nigra*

Select white oaks:
- White oak . . . . . *Quercus alba*
- Bur oak . . . . . *Quercus macrocarpa*
- Swamp chestnut oak . . . . . *Quercus michauxii*
- Chinkapin oak . . . . . *Quercus muehlenbergii*

White oaks:
- Swamp white oak . . . . . *Quercus bicolor*
- Overcup oak . . . . . *Quercus lyrata*

Other white oak:
- Post oak . . . . . *Quercus stellata* var. *stellata*

Select red oaks:
- Cherrybark oak *Quercus falcata* var. *pagodaefolia*
- Northern red oak . . . . . *Quercus rubra*
- Shumard oak. . . *Quercus shumardii* var. *shumardii*

Red oaks:
- Scarlet oak . . . . . *Quercus coccinea*
- Southern red oak . . *Quercus falcata* var. *falcata*
- Black oak . . . . . *Quercus velutina*

Other red oaks:
- Shingle oak . . . . . *Quercus imbricaria*
- Blackjack oak . . . . . *Quercus marilandica*
- Water oak . . . . . *Quercus nigra*
- Pin oak . . . . . *Quercus palustris*
- Willow oak . . . . . *Quercus phellos*

Other hard hardwoods:
- Black locust . . . . . *Robinia pseudoacacia*
- Common persimmon . . . . . *Diospyros virginiana*
- Flowering dogwood . . . . . *Cornus florida*
- Honeylocust . . . . . *Gleditsia triacanthos*
- Red mulberry . . . . . *Morus rubra*
- Sugarberry . . . . . *Celtis laevigata*
- Osage-orange . . . . . *Maclura pomifera*

SOFT HARDWOOD SPECIES

American basswood . . . . . *Tilia americana*

American sycamore . . . . . *Platanus occidentalis*

Black cherry . . . . . *Prunus serotina*

Butternut. . . . . *Juglans cinerea*

Cottonwoods:
- Eastern cottonwood . . . . . *Populus deltoides*

Elms:
- Winged elm . . . . . *Ulmus alata*
- American elm . . . . . *Ulmus americana*
- Slippery elm . . . . . *Ulmus rubra*
- Rock elm . . . . . *Ulmus thomasii*

Soft maples:
- Red maple . . . . . *Acer rubrum* var. *rubrum*
- Silver maple . . . . . *Acer saccharinum*

Sweetgum . . . . . *Liquidambar styraciflua*

Tupelo and blackgum:
- Blackgum . . . . . *Nyssa sylvatica* var. *biflora*
- Black tupelo . . . *Nyssa sylvatica* var. *sylvatica*
- Water tupelo . . . . . *Nyssa aquatica*

Yellow-poplar. . . . . *Liriodendron tulipifera*

Other soft hardwoods:
- Black willow . . . . . *Salix nigra*
- Boxelder . . . . . *Acer negundo*
- Cucumbertree . . . . . *Magnolia acuminata*
- Hackberry. . . . . *Celtis occidentalis*
- Kentucky coffeetree. . . . . *Gymnocladus dioicus*
- Northern catalpa . . . . . *Catalpa speciosa*
- Ohio Buckeye . . . . . *Aesculus glabra*
- Sassafras . . . . . *Sassafras albidum*

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[26] *The common and scientific names are based on "Check List of Native and Naturalized Trees of the United States (Including Alaska)" by Elbert L. Little, Jr., U.S. Dep. Agric., Agric. Handb. 41, 472 p. 1953.*

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[27] *Tables containing growth, mortality, and removals information are dated 1971. Tables containing forest area and timber inventory information are dated 1972 and represent conditions as of January 1, 1972, following changes to the area and inventory estimated to have occurred during calendar year 1971. Forest industry information is dated 1969 and results from a separate study of industry use of timber products during calendar year 1969.*

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Table 14.--*Area of land by land class, Missouri, 1959 and 1972*

(In thousand acres)

Land class	1959[1]	1972
Commercial forest land:		
Shortleaf pine type	277.89	116.00
Eastern red cedar type	103.77	88.30
Eastern red cedar hardwood type	185.28	259.40
Shortleaf pine-oak type	569.79	281.10
Post-blackjack oak type	1,775.63	2,488.20
Black scarlet oak type	5,164.02	4,409.40
White oak type	1,611.91	2,644.50
Oak-gum-cypress type	269.66	177.70
Elm-ash-cottonwood type	1,283.91	660.60
Cottonwood type	1.80	4.80
Maple-beech type	85.23	310.80
Nonstocked	2,489.37	923.90
Subtotal	13,818.26	12,364.70
Noncommercial forest land:		
Unproductive	357.76	298.30
Productive-reserved	90.30	256.10
Subtotal	448.06	554.40
Nonforest land	30,047.98	31,270.20
Total	44,314.30	44,189.30

[1]Figures have been adjusted from those published previously for 1959 to conform to 1972 land classes because of changes in survey definitions and procedures.

Table 15.--*Area by land class and Forest Survey Unit, Missouri, 1972*

(In thousand acres)

Land class	All units	Eastern Ozarks	Southwestern Ozarks	Northwestern Ozarks	Prairie	Riverborder
Forest land:						
Commercial	12,364.7	4,084.0	2,311.4	1,920.0	1,940.4	2,108.9
Productive reserved	256.1	97.3	22.6	73.6	46.5	16.1
Unproductive	298.3	63.3	109.3	77.4	15.9	32.4
Total	12,919.1	4,244.6	2,443.3	2,071.0	2,002.8	2,157.4
Nonforest land:						
Cropland[1]	20,954.6	1,074.6	1,551.8	1,513.3	12,640.8	4,174.1
Pasture and range[1]	3,278.6	157.2	422.7	384.2	1,970.9	343.6
Wooded pasture	2,803.1	182.6	629.6	657.7	988.4	344.8
Other[2]	4,233.9	504.0	392.9	403.3	1,945.3	988.4
Total	31,270.2	1,918.4	2,997.0	2,958.5	17,545.4	5,850.9
Total area[3]	44,189.3	6,163.0	5,440.3	5,029.5	19,548.2	8,008.3

[1]Source: 1969 Census of Agriculture.

[2]Includes marshland, industrial and urban areas, other nonforest land, and 77,700 acres classed as water by forest survey standards but defined by the Bureau of Census as land.

[3]Source: United States Bureau of the Census, Land and water areas of the United States, 1970.

Table 16.--*Area of commercial forest land by ownership class and Forest Survey Unit, Missouri, 1972*

(In thousand acres)

Ownership class	All units	Eastern Ozarks	Southwestern Ozarks	Northwestern Ozarks	Prairie	Riverborder
National Forest	1,321.8	870.0	328.5	114.1	--	9.2
Other Federal	67.2	5.8	3.0	42.0	3.3	13.1
State, county, and municipal	219.0	162.8	10.5	8.5	14.6	22.6
Forest industry	362.3	307.3	39.5	0.7	0.4	14.4
Farmer-owned	6,136.8	1,264.7	1,151.6	1,054.1	1,314.9	1,351.5
Miscellaneous private	4,257.6	1,473.4	778.3	700.6	607.2	698.1
All ownerships	12,364.7	4,084.0	2,311.4	1,920.0	1,940.4	2,108.9

Table 17.--*Area of commercial forest land by ownership class and ownership-size class, Missouri, 1972*

(In thousand acres)

Ownership class	All size of owner classes	1 to 500 acres	500 to 5,000 acres	5,000 acres or more
National Forest	1,321.8	--	--	1,321.8
Other Federal	67.2	--	--	67.2
State, county, and municipal	219.0	--	--	219.0
Forest industry	362.3	29.8	13.0	319.5
Farmer and miscellaneous private	10,394.4	8,814.1	1,107.4	472.9
All ownerships	12,364.7	8,843.9	1,120.4	2,400.4

Table 18.--*Area of commercial forest land by stand-size and ownership class, and Forest Survey Unit, Missouri, 1972*

(In thousand acres)

Stand-size class	All ownerships	National Forest	Other Federal	State, county, and municipal	Forest industry	Farmer and miscellaneous private
All units						
Sawtimber	4,002.1	320.7	21.0	63.8	115.6	3,481.0
Poletimber	4,967.0	683.2	4.6	100.0	132.8	4,046.4
Sapling and seedling	2,471.7	307.9	28.9	47.0	110.4	1,977.5
Nonstocked areas	923.9	10.0	12.7	8.2	3.5	889.5
All classes	12,364.7	1,321.8	67.2	219.0	362.3	10,394.4
Eastern Ozarks						
Sawtimber	1,145.7	219.7	2.3	42.8	97.6	783.3
Poletimber	1,971.3	515.5	3.0	81.8	110.9	1,260.1
Sapling and seedling	827.5	130.2	0.5	35.2	98.8	562.8
Nonstocked areas	139.5	4.6	--	3.0	--	131.9
All classes	4,084.0	870.0	5.8	162.8	307.3	2,738.1
Southwestern Ozarks						
Sawtimber	705.3	68.3	--	7.0	11.4	618.6
Poletimber	741.2	97.9	1.6	--	13.0	628.7
Sapling and seedling	698.9	158.7	1.4	1.7	11.6	525.5
Nonstocked areas	166.0	3.6	--	1.8	3.5	157.1
All classes	2,311.4	328.5	3.0	10.5	39.5	1,929.9
Northwestern Ozarks						
Sawtimber	572.6	29.8	12.4	--	--	530.4
Poletimber	751.8	64.0	--	6.4	0.7	680.7
Sapling and seedling	398.7	18.5	18.0	2.1	--	360.1
Nonstocked areas	196.9	1.8	11.6	--	--	183.5
All classes	1,920.0	114.1	42.0	8.5	0.7	1,754.7
Prairie						
Sawtimber	735.8	--	2.2	2.4	0.4	730.8
Poletimber	744.4	--	--	8.6	--	735.8
Sapling and seedling	111.2	--	--	2.5	--	108.7
Nonstocked areas	349.0	--	1.1	1.1	--	346.8
All classes	1,940.4	--	3.3	14.6	0.4	1,922.1
Riverborder						
Sawtimber	842.7	2.9	4.1	11.6	6.2	817.9
Poletimber	758.3	5.8	--	3.2	8.2	741.1
Sapling and seedling	435.4	0.5	9.0	5.5	--	420.4
Nonstocked areas	72.5	--	--	2.3	--	70.2
All classes	2,108.9	9.2	13.1	22.6	14.4	2,049.6

Table 19.--*Area of commercial forest land by stand-volume and ownership class, Missouri, 1972*

(In thousand acres)

Stand volume per acre (board feet)1/	All ownerships	National Forest	Other Federal	State, county, and municipal	Forest industry	Farmer and miscellaneous private
Less than 1,500	8,159.0	570.2	50.8	128.2	235.3	7,174.5
1,500 to 5,000	3,739.3	613.8	16.0	79.2	126.7	2,903.6
More than 5,000	466.4	137.8	.4	11.6	.3	316.3
All classes	12,364.7	1,321.8	67.2	219.0	362.3	10,394.4

1/ International 1/4-inch rule.

Table 20.--*Area of commercial forest land by stocking class based on selected stand components, Missouri, 1972*

(In thousand acres)

Stocking percentage	Stocking classified in terms of					
	All trees	Growing-stock trees			Rough and rotten trees	Inhibiting vegetation
		Total	Desirable	Acceptable		
150-159	4.3	--	--	--	--	--
140-149	45.1	--	--	--	--	--
130-139	235.7	3.5	--	--	9.5	--
120-129	879.0	19.0	--	6.1	5.4	--
110-119	1,701.6	64.9	--	30.8	9.5	--
100-109	2,565.0	188.7	--	102.0	59.3	--
90-99	2,778.8	379.5	--	241.2	178.3	--
80-89	2,159.5	734.3	--	614.3	467.5	--
70-79	1,113.7	1,072.3	--	1,018.3	885.1	--
60-69	577.1	1,462.9	4.8	1,450.3	1,550.6	--
50-59	213.2	1,870.9	--	1,923.0	2,057.0	--
40-49	58.7	1,970.1	23.5	2,099.6	2,432.1	1.6
30-39	14.9	1,867.5	50.7	2,034.3	2,065.9	.9
20-29	18.1	1,455.3	156.3	1,500.0	1,560.5	6.2
10-19	--	820.3	386.3	877.9	857.3	19.2
Less than 10	--	455.5	11,743.1	466.9	226.7	12,336.8
Total	12,364.7	12,364.7	12,364.7	12,364.7	12,364.7	12,364.7

Table 21.--*Area of commercial forest land by area-condition and ownership class, Missouri, 1972*

(In thousand acres)

Area-condition class	All ownerships	National Forest	Other Federal	State, county, and municipal	Forest industry	Farmer and miscellaneous private
40	4.8	--	--	--	--	4.8
50	303.6	173.7	9.1	6.0	3.0	111.8
60	3,764.7	822.6	23.4	93.7	178.1	2,646.9
70	8,291.6	325.5	34.7	119.3	181.2	7,630.9
All classes	12,364.7	1,321.8	67.2	219.0	362.3	10,394.4

Table 22.--*Area of commercial forest land by site and ownership class, Missouri, 1972*

(In thousand acres)

Site class (cubic feet of growth) per acre per year)	All ownerships	National Forest	Other Federal[1/]	State, county, and municipal	Forest industry	Farmer and miscellaneous private
165 or more	3.1	--	--	--	--	3.1
120 to 164	29.2	--	--	--	2.6	26.6
85 to 119	528.2	46.6	9.2	11.3	9.4	451.7
50 to 84	2,886.8	355.5	19.9	79.3	104.6	2,327.5
Less than 50	8,917.4	919.7	38.1	128.4	245.7	7,585.5
All classes	12,364.7	1,321.8	67.2	219.0	362.3	10,394.4

1/ Bureau of Sport Fisheries and Wildlife, U.S.D.I.

Table 23.--*Area of commercial forest land by forest type and ownership class, Missouri, 1972*

(In thousand acres)

Forest type	All ownerships	National Forest[1/]	Other Federal	State, county, and municipal	Forest industry	Farmer and miscellaneous private
Shortleaf pine	116.0	107.6	0.5	--	--	7.9
Eastern redcedar	88.3	9.2	--	1.4	--	77.7
Eastern redcedar-hardwood	259.4	59.1	--	2.2	--	198.1
Shortleaf pine-oak	281.1	166.8	--	11.0	54.0	49.3
Post-blackjack oak	2,488.2	43.6	15.5	23.8	84.7	2,320.6
Black-scarlet oak	4,409.4	701.0	9.1	106.5	173.5	3,419.3
White oak	2,644.5	215.2	1.2	48.8	20.9	2,358.4
Oak-gum-cypress	177.7	--	8.0	6.5	--	163.2
Elm-ash-cottonwood	660.6	9.3	20.2	6.5	23.9	600.7
Cottonwood	4.8	--	--	--	1.8	3.0
Maple-beech	310.8	--	--	4.1	--	306.7
Nonstocked[2/]	923.9	10.0	12.7	8.2	3.5	889.5
All forest types	12,364.7	1,321.8	67.2	219.0	362.3	10,394.4

1/ Estimates of area of some forest types for National Forest owner differ from those shown in current timber management plans for the National Forests in Missouri.

2/ See glossary for stand-size classes.

Table 24.--*Area of noncommercial forest land by forest type, Missouri, 1972*

(In thousand acres)

Forest type	All areas	Productive reserved areas	Unproductive areas
Shortleaf pine	1.0	1.0	--
Eastern redcedar	43.7	1.7	42.0
Eastern redcedar-hardwood	63.1	.3	62.8
Shortleaf pine-oak	1.3	1.3	--
Post-blackjack oak	183.1	63.4	119.7
Black-scarlet oak	147.2	93.9	53.3
White oak	91.1	70.6	20.5
Oak-gum-cypress	.1	.1	--
Elm-ash-cottonwood	23.7	23.7	--
Maple-beech	.1	.1	--
All forest types	554.4	256.1	298.3

Table 25.--*Area of land and forest land by county, Missouri, 1972*

COUNTY	LAND AREA	FOREST LAND			COMMERCIAL FOREST AS A PERCENT OF LAND AREA
		ALL FOREST	NON-COMMERCIAL	COMMERCIAL	
	THOUSAND ACRES				PERCENT
ADAIR	365.8	52.6	3.3	49.3	13
ANDREW	278.9	16.2	.1	16.1	6
ATCHISON	351.5	14.0	.1	13.9	4
AUDRAIN	442.9	29.3	.2	29.1	7
BARRY	501.0	197.1	14.5	182.6	36
BARTON	380.2	25.7	.1	25.6	7
BATES	538.4	49.5	.2	49.3	9
BENTON	470.5	200.2	33.6	166.6	35
BOLLINGER	397.5	203.5	1.8	201.7	51
BOONE	438.3	112.6	3.0	109.6	25
BUCHANAN	258.4	19.8	.1	19.7	8
BUTLER	457.8	173.9	5.8	168.1	37
CALDWELL	275.2	17.8	.1	17.7	6
CALLAWAY	534.4	179.0	3.5	175.5	33
CAMDEN	409.6	230.9	17.6	213.3	52
CAPE GIRARDEAU	367.3	91.1	3.7	87.4	24
CARROLL	446.0	27.1	.2	26.9	6
CARTER	323.9	270.6	18.8	251.8	78
CASS	446.5	34.9	.4	34.5	8
CEDAR	317.4	81.1	8.9	72.2	23
CHARITON	482.4	42.1	.2	41.9	9
CHRISTIAN	362.9	136.7	8.3	128.4	35
CLARK	323.6	53.6	.4	53.2	16
CLAY	263.6	22.5	.5	22.0	8
CLINTON	268.7	18.9	.4	18.5	7
COLE	245.7	79.8	1.9	77.9	32
COOPER	361.9	49.0	.4	48.6	13
CRAWFORD	486.4	324.5	3.6	320.9	66
DADE	322.6	49.1	10.0	39.1	12
DALLAS	343.7	131.2	5.0	126.2	37
DAVIESS	360.3	32.6	.3	32.3	9
DEKALB	270.7	13.9	.1	13.8	5
DENT	483.5	316.4	8.2	308.2	64
DOUGLAS	517.6	254.4	8.3	246.1	48
DUNKLIN	347.5	20.1	--	20.1	6
FRANKLIN	597.6	243.7	9.2	234.5	39
GASCONADE	332.4	157.4	3.1	154.3	46
GENTRY	312.3	25.9	.2	25.7	8
GREENE	433.0	58.9	.4	58.5	14
GRUNDY	278.4	27.1	.7	26.4	9
HARRISON	460.8	45.1	.4	44.7	10
HENRY	469.6	60.4	21.6	38.8	8
HICKORY	254.0	108.0	8.0	100.0	39
HOLT	292.9	18.9	.1	18.8	6
HOWARD	301.7	63.6	1.1	62.5	21
HOWELL	588.8	277.3	6.7	270.6	46
IRON	354.5	289.2	4.1	285.1	80
JACKSON	385.6	22.6	.1	22.5	6
JASPER	410.9	46.8	.4	46.4	11
JEFFERSON	427.3	219.8	3.3	216.5	51
JOHNSON	528.6	54.1	3.5	50.6	10
KNOX	327.7	33.0	.3	32.7	10
LACLEDE	492.8	204.2	9.0	195.2	40
LAFAYETTE	404.2	22.0	.1	21.9	5
LAWRENCE	396.2	50.2	.7	49.5	12
LEWIS	324.9	48.0	.5	47.5	15
LINCOLN	400.1	86.0	6.6	79.4	20

(TABLE 25 CONTINUED ON NEXT PAGE)

(TABLE 25 CONTINUED)

COUNTY	LAND AREA	FOREST LAND			COMMERCIAL FOREST AS A PERCENT OF LAND AREA
		ALL FOREST	NON-COMMERCIAL	COMMERCIAL	
	THOUSAND ACRES				PERCENT
LINN	398.4	30.5	1.2	29.3	7
LIVINGSTON	339.4	30.4	.1	30.3	9
MCDONALD	345.6	170.6	3.7	166.9	48
MACON	520.7	63.9	.7	63.2	12
MADISON	317.4	230.5	2.8	227.7	72
MARIES	335.8	143.6	6.5	137.1	41
MARION	280.3	42.7	.6	42.1	15
MERCER	291.0	29.0	.3	28.7	10
MILLER	384.0	165.4	13.0	152.4	40
MISSISSIPPI	265.7	13.8	.9	12.9	5
MONITEAU	268.0	61.1	1.5	59.6	22
MONROE	428.2	51.9	1.4	50.5	12
MONTGOMERY	341.7	104.4	2.3	102.1	30
MORGAN	379.0	166.7	4.5	162.2	43
NEW MADRID	434.8	15.5	--	15.5	4
NEWTON	402.5	105.9	2.3	103.6	26
NODAWAY	561.3	25.4	.1	25.3	5
OREGON	501.8	323.0	6.6	316.4	63
OSAGE	388.9	174.3	4.1	170.2	44
OZARK	468.1	259.1	22.8	236.3	50
PEMISCOT	315.4	11.8	--	11.8	4
PERRY	301.4	104.6	1.2	103.4	34
PETTIS	434.4	40.9	.3	40.6	9
PHELPS	433.3	221.1	8.4	212.7	49
PIKE	435.9	93.0	.9	92.1	21
PLATTE	273.1	32.6	.3	32.3	12
POLK	410.9	87.1	3.7	83.4	20
PULASKI	352.3	183.5	7.9	175.6	50
PUTNAM	331.5	40.9	.4	40.5	12
RALLS	306.0	47.7	.4	47.3	15
RANDOLPH	309.5	49.8	.6	49.2	16
RAY	366.8	38.8	.4	38.4	10
REYNOLDS	523.1	436.5	13.5	423.0	81
RIPLEY	409.0	274.2	4.5	269.7	66
ST. CHARLES	352.6	90.1	.5	89.6	25
ST. CLAIR	446.2	148.0	24.9	123.1	28
ST. FRANCOIS	292.3	148.4	7.3	141.1	48
STE. GENEVIEVE	319.6	156.6	4.8	151.8	47
ST. LOUIS	358.8	68.9	2.8	66.1	18
SALINE	484.6	32.2	.7	31.5	7
SCHUYLER	195.8	13.5	.1	13.4	7
SCOTLAND	282.2	21.4	.1	21.3	8
SCOTT	269.5	18.0	--	18.0	7
SHANNON	639.4	518.4	41.4	477.0	75
SHELBY	320.8	35.2	.3	34.9	11
STODDARD	526.8	46.1	--	46.1	9
STONE	287.5	131.9	7.8	124.1	43
SULLIVAN	418.5	38.8	.3	38.5	9
TANEY	393.9	235.7	38.2	197.5	50
TEXAS	757.1	384.3	10.7	373.6	49
VERNON	536.1	64.1	.4	63.7	12
WARREN	272.9	125.1	1.6	123.5	45
WASHINGTON	486.4	359.0	4.0	355.0	73
WAYNE	490.0	376.5	38.2	338.3	69
WEBSTER	377.6	123.4	3.2	120.2	32
WORTH	170.9	12.5	.1	12.4	7
WRIGHT	437.7	166.9	5.4	161.5	37
TOTAL	44,189.3	12,919.1	554.4	12,364.7	28

Table 26.--*Area of commercial forest land by forest type, stand-size class, and Forest Survey Unit, Missouri, 1972*

(In thousand acres)

Forest type	All stands	Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked areas
STATE TOTAL					
Shortleaf pine	116.0	47.7	48.8	19.5	--
Eastern redcedar	88.3	7.5	28.2	52.6	--
Eastern redcedar-hardwood	259.4	25.8	28.5	205.1	--
Shortleaf pine-oak	281.1	87.9	147.9	45.3	--
Post-blackjack oak	2,488.2	528.9	1,174.3	785.0	--
Black-scarlet oak	4,409.4	1,553.7	1,927.1	928.6	--
White oak	2,644.5	1,160.7	1,219.0	264.8	--
Oak-gum-cypress	177.7	81.2	78.4	18.1	--
Elm-ash-cottonwood	660.6	390.8	192.3	77.5	--
Cottonwood	4.8	4.8	--	--	--
Maple-beech	310.8	113.1	122.5	75.2	--
Nonstocked[1]	923.9	--	--	--	923.9
All forest types	12,364.7	4,002.1	4,967.0	2,471.7	923.9
EASTERN OZARKS SURVEY UNIT					
Shortleaf pine	98.2	39.5	39.2	19.5	--
Eastern redcedar	12.4	3.0	1.7	7.7	--
Eastern redcedar-hardwood	20.4	--	1.7	18.7	--
Shortleaf pine-oak	211.7	56.7	122.6	32.4	--
Post-blackjack oak	709.4	142.2	294.4	272.8	--
Black-scarlet oak	1,896.0	603.7	962.8	329.5	--
White oak	836.6	242.7	484.7	109.2	--
Oak-gum-cypress	13.7	7.1	3.6	3.0	--
Elm-ash-cottonwood	78.5	37.1	30.5	10.9	--
Maple-beech	67.6	13.7	30.1	23.8	--
Nonstocked[1]	139.5	--	--	--	139.5
All forest types	4,084.0	1,145.7	1,971.3	827.5	139.5
SOUTHWESTERN OZARKS SURVEY UNIT					
Shortleaf pine	17.8	8.2	9.6	--	--
Eastern redcedar	12.6	--	--	12.6	--
Eastern redcedar-hardwood	85.1	9.0	14.1	62.0	--
Shortleaf pine-oak	65.1	30.1	22.1	12.9	--
Post-blackjack oak	723.8	177.1	258.9	287.8	--
Black-scarlet oak	910.3	331.6	306.1	272.6	--
White oak	287.5	128.9	116.4	42.2	--
Elm-ash-cottonwood	29.5	13.7	7.0	8.8	--
Maple-beech	13.7	6.7	7.0	--	--
Nonstocked[1]	166.0	--	--	--	166.0
All forest types	2,311.4	705.3	741.2	698.9	166.0

(Table 26 continued on next page)

(Table 26 continued)

Forest type	All stands	Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked areas
NORTHWESTERN OZARKS SURVEY UNIT					
Eastern redcedar	4.0	--	4.0	--	--
Eastern redcedar-hardwood	38.5	0.8	--	37.7	--
Post-blackjack oak	636.0	134.9	344.6	156.5	--
Black-scarlet oak	630.5	249.4	239.6	141.5	--
White oak	338.9	134.8	163.6	40.5	--
Elm-ash-cottonwood	64.1	52.7	--	11.4	--
Maple-beech	11.1	--	--	11.1	--
Nonstocked[1]	196.9	--	--	--	196.9
All forest types	1,920.0	572.6	751.8	398.7	196.9
PRAIRIE SURVEY UNIT					
Post-blackjack oak	137.5	26.5	101.4	9.6	--
Black-scarlet oak	486.7	187.4	259.0	40.3	--
White oak	480.3	246.5	203.5	30.3	--
Oak-gum-cypress	107.4	47.0	49.2	11.2	--
Elm-ash-cottonwood	294.5	181.4	93.3	19.8	--
Maple-beech	85.0	47.0	38.0	--	--
Nonstocked[1]	349.0	--	--	--	349.0
All forest types	1,940.4	735.8	744.4	111.2	349.0
RIVERBORDER SURVEY UNIT					
Eastern redcedar	59.3	4.5	22.5	32.3	--
Eastern redcedar-hardwood	115.4	16.0	12.7	86.7	--
Shortleaf pine-oak	4.3	1.1	3.2	--	--
Post-blackjack oak	281.5	48.2	175.0	58.3	--
Black-scarlet oak	485.9	181.6	159.6	144.7	--
White oak	701.2	407.8	250.8	42.6	--
Oak-gum-cypress	56.6	27.1	25.6	3.9	--
Elm-ash-cottonwood	194.0	105.9	61.5	26.6	--
Cottonwood	4.8	4.8	--	--	--
Maple-beech	133.4	45.7	47.4	40.3	--
Nonstocked[1]	72.5	--	--	--	72.5
All forest types	2,108.9	842.7	758.3	435.4	72.5

[1]See glossary for stand-size classes.

Table 27.--*Area of commercial forest land by forest type and stand-age class, Missouri, 1972*

(In thousand acres)

Forest type	All ages	Stand-age class (years)											
		0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100-119	120+
Shortleaf pine	116.0	11.3	9.8	6.1	27.5	19.7	30.8	10.8	--	--	--	--	--
Eastern redcedar	88.3	15.4	27.8	3.1	6.3	--	5.4	16.0	8.1	6.2	--	--	--
Eastern redcedar-hardwood	259.4	57.7	98.1	33.1	14.3	17.1	7.5	16.7	--	2.2	2.6	10.1	--
Shortleaf pine-oak	281.1	13.7	28.3	14.0	42.1	77.6	62.9	23.6	14.4	--	4.5	--	--
Post-blackjack oak	2,488.2	259.6	447.5	191.9	290.5	317.8	299.0	207.2	160.2	106.6	72.2	85.5	50.2
Black-scarlet oak	4,409.4	378.9	458.1	282.0	632.9	803.2	775.2	412.7	277.8	125.8	133.7	100.2	28.9
White oak	2,644.5	103.6	137.5	112.6	218.6	436.1	382.3	359.8	272.2	151.2	189.5	213.8	67.3
Oak-gum-cypress	177.7	11.6	.9	46.8	38.5	24.0	19.4	6.7	4.0	4.8	8.5	7.0	5.5
Elm-ash-cottonwood	660.6	48.0	25.9	106.9	129.1	138.7	82.6	52.3	26.9	24.6	15.5	8.0	2.1
Cottonwood	4.8	--	--	3.0	--	1.8	--	--	--	--	--	--	--
Maple-beech	310.8	60.9	11.4	31.3	53.6	40.3	25.7	17.2	21.9	13.0	15.7	10.6	9.2
Nonstocked[1/]	923.9	335.5	221.7	86.1	69.5	34.9	48.3	37.7	30.3	21.6	31.1	--	7.2
All forest types	12,364.7	1,296.2	1,467.0	916.9	1,522.9	1,911.2	1,739.1	1,160.7	815.8	456.0	473.3	435.2	170.4

1/ See glossary for stand-size classes.

Table 28.--*Area of commercial forest land by forest type and area-condition class, Missouri, 1972*

(In thousand acres)

Forest type	All area conditions	Class 40	Class 50	Class 60	Class 70
Shortleaf pine	116.0	--	51.4	48.6	16.0
Eastern redcedar	88.3	--	--	15.1	73.2
Eastern redcedar-hardwood	259.4	--	--	66.0	193.4
Shortleaf pine-oak	281.1	--	20.1	177.3	83.7
Post-blackjack oak	2,488.2	--	28.2	516.6	1,943.4
Black-scarlet oak	4,409.4	--	107.1	1,605.6	2,696.7
White oak	2,644.5	4.8	67.4	1,027.8	1,544.5
Oak-gum-cypress	177.7	--	8.0	52.1	117.6
Elm-ash-cottonwood	660.6	--	21.4	183.7	455.5
Cottonwood	4.8	--	--	4.8	--
Maple-beech	310.8	--	--	67.1	243.7
Nonstocked	923.9	--	--	--	923.9
All forest types	12,364.7	4.8	303.6	3,764.7	8,291.6

Table 29.--*Area of commercial forest land by forest type and site-index class, Missouri, 1972*

(In thousand acres)

Forest type	All classes	Site-index class (height in feet at 50 years)							
		20-29	30-39	40-49	50-59	60-69	70-79	80-89	90+
Shortleaf pine	116.0	--	3.1	12.9	66.0	25.8	8.2	--	--
Eastern redcedar	88.3	15.3	50.4	22.6	--	--	--	--	--
Eastern redcedar-hardwood	259.4	13.7	115.9	67.0	30.5	23.4	6.2	2.7	--
Shortleaf pine-oak	281.1	--	7.2	53.7	97.1	86.3	36.8	--	--
Post-blackjack oak	2,488.2	79.2	474.8	761.1	720.7	272.0	149.6	30.8	--
Black-scarlet oak	4,409.4	8.2	95.8	616.1	1,564.6	1,242.2	624.6	234.1	23.8
White oak	2,644.5	4.1	345.3	638.1	1,024.3	361.1	199.5	66.7	5.4
Oak-gum-cypress	177.7	--	--	29.7	25.6	19.2	26.2	47.9	29.1
Elm-ash-cottonwood	660.6	--	8.6	29.9	94.9	159.2	133.8	130.3	103.9
Cottonwood	4.8	--	--	--	--	--	--	--	4.8
Maple-beech	310.8	--	13.5	74.0	100.8	48.7	50.3	13.1	10.4
Nonstocked[1/]	923.9	44.6	92.8	255.0	318.8	101.3	66.9	35.3	9.2
All forest types	12,364.7	165.1	1,207.4	2,560.1	4,043.3	2,339.2	1,302.1	560.9	186.6

1/ See glossary for stand-size classes.

Table 30.--*Area of commercial forest land by stocking class of growing-stock trees and stand-size class, Missouri, 1972*

(In thousand acres)

Stocking percentage	All stands	Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked areas
134 or more	3.5	--	3.5	--	--
100 to 133	272.7	128.5	121.4	22.8	--
60 to 100	3,648.9	1,341.8	1,726.5	580.6	--
17 to 60	7,502.4	2,531.8	3,104.4	1,856.9	9.3
Less than 17	937.2	--	11.2	11.4	914.6
All classes	12,364.7	4,002.1	4,967.0	2,471.7	923.9

Table 31.--*Area of commercial forest land by forest type and basal-area class, Missouri, 1972*

(In thousand acres)

Forest type	All classes	Basal-area class (square feet per acre)							
		0-19	20-39	40-59	60-79	80-99	100-119	120-139	140-159
Shortleaf pine	116.0	3.1	6.3	15.6	18.8	22.2	42.6	7.4	--
Eastern redcedar	88.3	13.7	14.0	31.2	24.3	5.1	--	--	--
Eastern redcedar-hardwood	259.4	49.7	38.5	79.6	57.7	28.1	5.8	--	--
Shortleaf pine-oak	281.1	--	7.6	97.2	79.4	65.0	22.0	9.9	--
Post-blackjack oak	2,488.2	69.4	230.2	765.1	831.1	399.4	183.3	9.7	--
Black-scarlet oak	4,409.4	101.2	306.0	1,282.5	1,459.3	953.8	287.2	19.4	--
White oak	2,644.5	23.9	120.6	582.9	999.7	642.8	249.8	24.8	--
Oak-gum-cypress	177.7	3.6	11.5	29.5	50.9	25.2	31.0	18.5	7.5
Elm-ash-cottonwood	660.6	21.0	45.4	153.0	142.6	173.0	83.4	27.5	14.7
Cottonwood	4.8	--	--	--	--	1.8	3.0	--	--
Maple-beech	310.8	41.7	28.9	89.2	90.7	36.9	19.6	3.8	--
Nonstocked[1/]	923.9	151.5	285.9	341.8	112.0	32.7	--	--	--
All forest types	12,364.7	478.8	1,094.9	3,467.6	3,866.5	2,386.0	927.7	121.0	22.2

1/ See Definitions of Terms in Appendix.

Table 32.--*Area of commercial forest land by forest type, stand-size class, and site class, Missouri, 1972*

(In thousand acres)

Forest type and stand-size class	All site classes	165 cu. ft. or more	120 to 165 cu. ft.	85 to 120 cu. ft.	50 to 85 cu. ft.	Less than 50 cu. ft.
Shortleaf pine						
Sawtimber	47.7	--	--	9.4	28.3	10.0
Poletimber	48.8	--	--	3.7	27.2	17.9
Sapling and seedling	19.5	--	--	--	5.0	14.5
All stands	116.0	--	--	13.1	60.5	42.4
Eastern redcedar						
Sawtimber	7.5	--	--	--	--	7.5
Poletimber	28.2	--	--	--	--	28.2
Sapling and seedling	52.6	--	--	--	--	52.6
All stands	88.3	--	--	--	--	88.3
Eastern redcedar-hardwood						
Sawtimber	25.8	--	--	--	.4	25.4
Poletimber	28.5	--	--	--	3.5	25.0
Sapling and seedling	205.1	--	--	--	13.8	191.3
All stands	259.4	--	--	--	17.7	241.7
Shortleaf pine-oak						
Sawtimber	87.9	--	--	--	30.0	57.9
Poletimber	147.9	--	--	--	47.7	100.2
Sapling and seedling	45.3	--	--	--	18.6	26.7
All stands	281.1	--	--	--	96.3	184.8
Post-blackjack oak						
Sawtimber	528.9	--	--	--	60.2	468.7
Poletimber	1,174.3	--	--	26.8	156.5	991.0
Sapling and seedling	785.0	--	--	12.0	112.1	660.9
All stands	2,488.2	--	--	38.8	328.8	2,120.6
Black-scarlet oak						
Sawtimber	1,553.8	--	--	86.7	539.3	927.8
Poletimber	1,927.0	--	--	86.1	684.2	1,156.7
Sapling and seedling	928.6	--	--	39.8	219.5	669.3
All stands	4,409.4	--	--	212.6	1,443.0	2,753.8
White oak						
Sawtimber	1,163.3	--	--	18.9	185.4	959.0
Poletimber	1,216.4	--	--	25.1	161.5	1,029.8
Sapling and seedling	264.8	--	--	7.3	55.0	202.5
All stands	2,644.5	--	--	51.3	401.9	2,191.3
Oak-gum-cypress						
Sawtimber	81.3	--	--	31.5	23.9	25.9
Poletimber	78.4	--	--	13.2	41.1	24.1
Sapling and seedling	18.0	--	--	1.1	5.8	11.1
All stands	177.7	--	--	45.8	70.8	61.1
Elm-ash-cottonwood						
Sawtimber	390.9	7.0	27.4	89.7	165.5	101.3
Poletimber	192.2	--	--	28.0	70.9	93.3
Sapling and seedling	77.5	--	3.9	16.1	19.0	38.5
All stands	660.6	7.0	31.3	133.8	255.4	233.1
Cottonwood						
Sawtimber	4.8	--	1.8	3.0	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
All stands	4.8	--	1.8	3.0	--	--
Maple-beech						
Sawtimber	109.1	--	--	6.6	45.6	56.9
Poletimber	123.2	--	--	3.1	37.8	82.3
Sapling and seedling	78.5	--	--	3.9	9.8	64.8
All stands	310.8	--	--	13.6	93.2	204.0
Nonstocked[1/]	923.9	--	--	37.3	126.3	760.3
All types	12,364.7	7.0	33.1	549.3	2,893.9	8,881.4

1/ See glossary for stand-size classes.

Table 33.--*Area of commercial forest land by county and stand-size class, Missouri, 1972*

(In thousand acres)

County	All stands	Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked areas
Adair	49.3	13.8	25.8	2.5	7.2
Andrew	16.1	5.0	6.3	0.7	4.1
Atchison	13.9	5.7	5.7	0.7	1.8
Audrain	29.1	11.6	11.5	1.4	4.6
Barry	182.6	56.5	57.0	57.2	11.9
Barton	25.6	11.2	5.4	1.5	7.5
Bates	49.3	22.4	11.9	3.0	12.0
Benton	166.6	54.2	61.3	32.8	18.3
Bollinger	201.7	67.7	90.0	35.1	8.9
Boone	109.6	39.0	39.5	27.2	3.9
Buchanan	19.7	6.5	7.6	1.1	4.5
Butler	168.1	51.9	75.3	30.9	10.0
Caldwell	17.7	7.4	6.1	0.7	3.5
Callaway	175.5	63.0	68.5	38.5	5.5
Camden	213.3	64.2	82.3	44.3	22.5
Cape Girardeau	87.4	38.1	28.9	17.6	2.8
Carroll	26.9	11.7	10.5	1.4	3.3
Carter	251.8	67.8	120.4	56.3	7.3
Cass	34.5	14.2	9.6	2.9	7.8
Cedar	72.2	24.1	25.2	14.2	8.7
Chariton	41.9	18.5	14.7	2.4	6.3
Christian	128.4	37.7	41.2	39.8	9.7
Clark	53.2	21.1	21.2	2.7	8.2
Clay	22.0	7.5	9.3	1.1	4.1
Clinton	18.5	7.6	7.1	1.1	2.7
Cole	77.9	25.2	28.2	20.9	3.6
Cooper	48.6	17.9	17.5	4.4	8.8
Crawford	320.9	93.6	155.3	60.8	11.2
Dade	39.1	12.2	14.3	3.4	9.2
Dallas	126.2	40.7	47.1	25.0	13.4
Daviess	32.3	11.4	15.3	1.5	4.1
DeKalb	13.8	5.9	4.6	0.6	2.7
Dent	308.2	77.0	152.8	67.6	10.8
Douglas	246.1	74.1	79.4	73.7	18.9
Dunklin	20.1	12.6	4.2	2.5	0.8
Franklin	234.5	102.3	82.4	43.3	6.5
Gasconade	154.3	60.5	63.0	27.1	3.7
Gentry	25.7	7.8	11.0	1.1	5.8
Greene	58.5	18.3	21.9	5.4	12.9
Grundy	26.4	10.5	8.7	1.0	6.2
Harrison	44.7	17.2	19.5	2.2	5.8
Henry	38.8	16.2	10.6	2.8	9.2
Hickory	100.0	32.9	37.1	19.4	10.6
Holt	18.8	5.5	8.2	1.1	4.0
Howard	62.5	21.7	20.3	17.9	2.6
Howell	270.6	91.0	84.6	75.9	19.1
Iron	285.1	75.6	149.1	53.2	7.2
Jackson	22.5	6.2	6.9	2.0	7.4
Jasper	46.4	20.3	11.4	2.7	12.0
Jefferson	216.5	87.6	78.6	42.3	8.0
Johnson	50.6	17.9	15.3	3.8	13.6
Knox	32.7	12.4	14.3	1.6	4.4
Laclede	195.2	54.5	75.9	44.7	20.1
Lafayette	21.9	9.9	5.1	1.7	5.2
Lawrence	49.5	19.8	16.7	4.4	8.6
Lewis	47.5	18.1	20.8	2.0	6.6
Lincoln	79.4	30.5	35.8	3.8	9.3

(Table 33 continued on next page)

(Table 33 continued)

County	All stands	Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked areas
Linn	29.3	11.1	10.5	1.5	6.2
Livingston	30.3	10.9	11.4	1.6	6.4
McDonald	166.9	54.7	58.8	42.5	10.9
Macon	63.2	20.6	31.0	3.0	8.6
Madison	227.7	64.5	114.9	41.8	6.5
Maries	137.1	34.3	58.9	31.8	12.1
Marion	42.1	15.1	20.4	2.0	4.6
Mercer	28.7	11.2	12.0	1.2	4.3
Miller	152.4	44.7	61.2	30.8	15.7
Mississippi	12.9	6.5	4.4	1.2	0.8
Moniteau	59.6	16.4	21.7	18.7	2.8
Monroe	50.5	19.9	20.4	2.4	7.8
Montgomery	102.1	37.4	38.3	22.7	3.7
Morgan	162.2	51.1	66.1	29.8	15.2
New Madrid	15.5	7.8	4.9	1.8	1.0
Newton	103.6	35.7	32.6	27.2	8.1
Nodaway	25.3	8.7	10.2	1.5	4.9
Oregon	316.4	85.9	137.7	79.3	13.5
Osage	170.2	60.2	64.5	39.1	6.4
Ozark	236.3	76.4	73.6	69.5	16.8
Pemiscot	11.8	6.9	4.0	0.3	0.6
Perry	103.4	43.7	36.9	20.2	2.6
Pettis	40.6	15.8	13.7	3.7	7.4
Phelps	212.7	56.3	92.2	46.5	17.7
Pike	92.1	35.8	41.0	4.2	11.1
Platte	32.3	7.8	15.6	1.5	7.4
Polk	83.4	24.8	31.8	16.2	10.6
Pulaski	175.6	48.9	70.3	39.3	17.1
Putnam	40.5	14.4	18.0	1.9	6.2
Ralls	47.3	18.9	19.4	2.0	7.0
Randolph	49.2	18.2	22.2	2.1	6.7
Ray	38.4	11.1	17.7	1.9	7.7
Reynolds	423.0	123.3	213.6	74.5	11.6
Ripley	269.7	73.4	129.0	57.9	9.4
St. Charles	89.6	42.9	27.4	16.2	3.1
St. Clair	123.1	41.9	42.4	23.9	14.9
St. Francois	141.1	34.6	63.4	35.6	7.5
St. Louis	66.1	27.0	20.2	16.1	2.8
Ste. Genevieve	151.8	54.2	62.3	31.4	3.9
Saline	31.5	12.0	9.3	2.9	7.3
Schuyler	13.4	4.8	5.4	0.7	2.5
Scotland	21.3	8.9	7.4	1.1	3.9
Scott	18.0	11.3	4.4	2.0	0.3
Shannon	477.0	122.0	228.3	112.2	14.5
Shelby	34.9	15.4	13.2	1.4	4.9
Stoddard	46.1	27.9	9.9	7.5	0.8
Stone	124.1	35.4	40.0	40.1	8.6
Sullivan	38.5	15.1	15.4	1.9	6.1
Taney	197.5	45.6	52.4	84.2	15.3
Texas	373.6	110.5	128.7	108.6	25.8
Vernon	63.7	33.3	14.4	3.4	12.6
Warren	123.5	50.5	45.8	20.9	6.3
Washington	355.0	110.1	174.2	59.5	11.2
Wayne	338.3	98.3	167.3	62.8	9.9
Webster	120.2	40.7	38.7	32.4	8.4
Worth	12.4	4.6	5.2	0.6	2.0
Wright	161.5	47.0	54.2	47.8	12.5
All counties	12,364.7	4,002.1	4,967.0	2,471.7	923.9

Table 34.--*Area of commercial forest land by county and forest type, Missouri, 1972*

(In thousand acres)

County	All forest types	Shortleaf pine	Eastern redcedar	Eastern redcedar-hardwood	Shortleaf pine-oak	Post-blackjack oak	Black-scarlet oak	White oak	Oak-gum-cypress 1/	Elm-ash-cottonwood	Cottonwood	Maple-beech	Nonstocked
Adair	49.3	--	--	--	--	1.6	14.4	17.5	2.8	3.6	--	2.2	7.2
Andrew	16.1	--	--	--	--	.3	3.6	3.9	.7	1.7	--	1.8	4.1
Atchison	13.9	--	--	--	--	.3	3.2	3.9	.6	3.5	--	.6	1.8
Audrain	29.1	--	--	--	--	.5	5.2	7.0	1.9	8.3	--	1.6	4.6
Barry	182.6	2.0	1.4	11.0	6.6	53.6	71.3	22.2	--	1.8	--	.8	11.9
Barton	25.6	--	--	--	--	2.3	5.9	2.8	1.3	5.0	--	.8	7.5
Bates	49.3	--	--	--	--	5.4	10.7	4.9	3.1	11.6	--	1.6	12.0
Benton	166.6	--	.2	3.1	--	52.5	54.2	29.7	--	7.5	--	1.1	18.3
Bollinger	201.7	2.0	.7	.7	7.1	34.5	92.8	43.9	1.3	5.4	--	4.4	8.9
Boone	109.6	--	3.3	7.1	--	16.0	25.6	34.8	1.8	9.1	.2	7.8	3.9
Buchanan	19.7	--	--	--	--	.2	3.0	3.5	1.4	4.8	--	2.3	4.5
Butler	168.1	9.2	.8	1.2	8.8	26.0	65.0	28.6	4.0	9.8	--	4.7	10.0
Caldwell	17.7	--	--	--	--	.2	3.0	3.8	1.0	5.2	--	1.0	3.5
Callaway	175.5	--	4.2	9.4	--	28.0	42.1	58.5	3.4	12.7	.2	11.5	5.5
Camden	213.3	--	.7	4.3	--	69.3	72.4	37.6	--	5.0	--	1.5	22.5
Cape Girardeau	87.4	--	2.4	5.2	--	10.8	18.6	32.7	1.1	7.5	.2	6.1	2.8
Carroll	26.9	--	--	--	--	.5	5.7	7.4	1.6	7.1	--	1.3	3.3
Carter	251.8	9.5	.7	1.0	15.1	43.8	117.1	51.0	.3	2.9	--	3.1	7.3
Cass	34.5	--	--	--	--	6.3	11.2	4.9	1.4	2.7	--	.2	7.8
Cedar	72.2	--	--	1.5	--	22.1	23.4	12.4	--	3.6	--	.5	8.7
Chariton	41.9	--	--	--	--	.5	6.8	9.8	3.2	13.1	--	2.2	6.3
Christian	128.4	1.1	.7	6.5	3.7	38.3	48.5	16.5	--	2.7	--	.7	9.7
Clark	53.2	--	--	--	--	1.1	13.1	17.8	3.1	7.3	--	2.6	8.2
Clay	22.0	--	--	--	--	.3	4.1	4.6	1.5	5.8	--	1.6	4.1
Clinton	18.5	--	--	--	--	.2	3.1	3.3	1.6	6.4	--	1.2	2.7
Cole	77.9	--	2.9	6.1	--	12.1	18.2	23.7	1.3	5.2	.1	4.7	3.6
Cooper	48.6	--	--	--	--	12.0	15.0	6.2	2.5	3.8	--	.3	8.8
Crawford	320.9	1.9	.9	.8	11.7	56.5	154.3	69.3	.8	8.5	--	5.0	11.2
Dade	39.1	--	--	--	--	8.5	12.1	4.5	1.6	2.8	--	.4	9.2
Dallas	126.2	--	--	2.9	--	40.2	41.7	22.3	--	4.9	--	.8	13.4
Daviess	32.3	--	--	--	--	.8	9.2	11.5	1.5	3.2	--	2.0	4.1
DeKalb	13.8	--	--	--	--	.2	2.9	3.5	.9	2.6	--	1.0	2.7
Dent	308.2	4.2	.9	1.2	13.2	57.6	148.7	63.4	.5	3.4	--	4.3	10.8
Douglas	246.1	3.3	.7	3.6	8.9	78.4	97.8	30.3	--	2.4	--	1.8	18.9
Dunklin	20.1	--	--	--	--	.4	1.7	1.0	5.7	9.7	.2	.6	.8
Franklin	234.5	--	8.3	13.0	.6	28.4	55.0	89.0	3.0	16.3	.3	14.1	6.5
Gsaconade	154.3	--	3.2	7.7	--	26.5	35.4	58.6	2.5	9.1	.1	7.5	3.7
Gentry	25.7	--	--	--	--	.5	6.1	6.9	1.2	3.3	--	1.9	5.8
Greene	58.5	--	--	--	--	13.9	18.4	7.1	2.6	3.2	--	.4	12.9
Grundy	26.4	--	--	--	--	.4	4.8	7.1	1.1	4.6	--	2.2	6.2
Harrison	44.7	--	--	--	--	1.0	11.4	14.5	2.7	7.2	--	2.1	5.8
Henry	38.8	--	--	--	--	5.2	9.1	3.9	2.1	8.1	--	1.2	9.2
Hickory	100.0	--	--	1.9	--	31.7	33.2	17.9	--	4.1	--	.6	10.6
Holt	18.8	--	--	--	--	.3	3.3	3.8	1.3	3.7	--	2.4	4.0
Howard	62.5	--	2.6	4.6	--	7.6	15.2	18.8	.9	5.2	.1	4.9	2.6
Howell	270.6	3.2	.6	3.4	8.3	86.7	113.1	32.5	--	2.0	--	1.7	19.1
Iron	285.1	3.9	.6	1.1	15.0	49.5	139.3	60.6	.4	3.8	--	3.7	7.2
Jackson	22.5	--	--	--	--	2.8	6.6	2.0	.8	2.5	--	.4	7.4
Jasper	46.4	--	--	--	--	6.8	12.2	5.6	2.5	6.5	--	.8	12.0
Jefferson	216.5	--	8.5	10.5	--	29.2	53.2	80.9	3.0	11.1	.1	12.0	8.0
Johnson	50.6	--	--	--	--	8.4	14.0	5.6	2.3	5.7	--	1.0	13.6
Knox	32.7	--	--	--	--	.8	8.7	11.1	1.8	4.5	--	1.4	4.4
Laclede	195.2	--	.4	4.5	--	67.8	62.9	33.5	--	5.0	--	1.0	20.1
Lafayette	21.9	--	--	--	--	2.7	5.4	2.4	1.3	4.4	--	.5	5.2
Lawrence	49.5	--	--	--	--	12.2	16.6	7.2	2.4	2.2	--	.3	8.6
Lewis	47.5	--	--	--	--	1.3	12.3	17.0	2.4	5.7	--	2.2	6.6
Lincoln	79.4	--	--	--	--	2.2	21.2	28.3	4.3	11.1	--	3.0	9.3

(Table 34 continued on next page)

(Table 34 continued)

County	All forest types	Shortleaf pine	Eastern redcedar	Eastern redcedar-hardwood	Shortleaf pine-oak	Post-blackjack oak	Black-scarlet oak	White oak	Oak-gum-cypress 1/	Elm-ash-cottonwood	Cottonwood	Maple-beech	Non-stocked
Linn	29.3	--	--	--	--	.3	4.3	5.9	1.7	8.7	--	2.2	6.2
Livingston	30.3	--	--	--	--	.3	5.0	6.2	1.8	7.9	--	2.7	6.4
McDonald	166.9	--	.2	2.0	3.5	54.8	71.0	21.7	--	1.9	--	.9	10.9
Macon	63.2	--	--	--	--	1.7	17.6	22.3	3.5	6.2	--	3.3	8.6
Madison	227.7	9.6	.6	1.5	17.4	34.9	102.8	44.3	.6	5.0	--	4.5	6.5
Maries	137.1	--	--	3.3	--	48.6	45.2	24.3	--	3.1	--	.5	12.1
Marion	42.1	--	--	--	--	1.4	11.8	15.6	2.2	4.4	--	2.1	4.6
Mercer	28.7	--	--	--	--	.7	7.7	9.8	1.4	3.1	--	1.7	4.3
Miller	152.4	--	--	3.0	--	50.6	48.8	27.8	--	5.7	--	.8	15.7
Mississippi	12.9	--	--	--	--	--	--	--	3.1	7.9	.5	.6	.8
Moniteau	59.6	--	2.3	4.2	--	9.4	15.1	16.7	1.3	3.3	--	4.5	2.8
Monroe	50.5	--	--	--	--	1.1	11.7	16.3	2.9	8.4	--	2.3	7.8
Montgomery	102.1	--	1.7	7.9	--	16.2	22.7	30.7	1.9	9.9	.3	7.1	3.7
Morgan	162.2	--	.5	2.5	--	53.5	55.5	30.3	--	3.7	--	1.0	15.2
New Madrid	15.5	--	--	--	--	--	--	--	3.2	10.1	.4	.8	1.0
Newton	103.6	--	.1	1.2	2.1	33.7	42.4	13.0	--	2.5	--	.5	8.1
Nodaway	25.3	--	--	--	--	.3	5.1	6.0	1.7	5.1	--	2.2	4.9
Oregon	316.4	7.0	1.3	1.9	19.0	59.2	142.9	61.8	.4	4.5	--	4.9	13.5
Osage	170.2	--	6.3	8.6	--	26.7	42.7	55.5	3.2	10.8	.2	9.8	6.4
Ozark	236.3	.9	1.6	10.7	6.4	73.6	92.5	29.1	--	3.5	--	1.2	16.8
Pemiscot	11.8	--	--	--	--	--	--	.3	2.4	7.4	.4	.7	.6
Perry	103.4	--	2.7	5.7	.5	13.4	24.2	38.7	1.3	7.6	.2	6.5	2.6
Pettis	40.6	--	--	--	--	9.1	11.6	5.2	2.3	4.4	--	.6	7.4
Phelps	212.7	--	1.1	3.7	--	76.1	71.9	37.8	--	3.4	--	1.0	17.7
Pike	92.1	--	--	--	--	2.3	24.7	32.9	4.8	12.2	--	4.1	11.1
Platte	32.3	--	--	--	--	.6	7.0	6.9	2.2	4.8	--	3.4	7.4
Polk	83.4	--	1.1	1.9	--	25.5	25.4	13.9	--	4.5	--	.5	10.6
Pulaski	175.6	--	--	3.5	--	60.9	57.7	30.2	--	5.2	--	1.0	17.1
Putnam	40.5	--	--	--	--	1.0	11.0	14.0	2.2	4.3	--	1.8	6.2
Ralls	47.3	--	--	--	--	1.1	12.2	16.8	2.5	5.5	--	2.2	7.0
Randolph	49.2	--	--	--	--	1.5	13.9	18.7	2.7	4.1	--	1.6	6.7
Ray	38.4	--	--	--	--	.8	8.7	9.8	2.7	6.6	--	2.1	7.7
Reynolds	423.0	7.2	.9	1.3	18.8	71.8	205.2	92.4	.7	6.8	--	6.3	11.6
Ripley	269.7	10.3	.8	1.2	17.1	46.8	119.2	51.6	1.2	6.9	--	5.2	9.4
St. Charles	89.6	--	1.9	6.2	--	7.7	17.0	30.0	1.1	14.7	.6	7.3	3.1
St. Clair	123.1	--	--	2.4	--	37.2	38.2	21.2	--	8.4	--	.8	14.9
St. Francois	141.1	1.2	.9	2.2	6.1	26.9	62.0	26.2	.4	4.2	--	3.5	7.5
Ste. Genevieve	151.8	--	3.8	7.1	3.2	24.5	37.4	53.7	2.8	6.7	--	8.7	3.9
St. Louis	66.1	--	2.4	5.6	--	6.3	14.6	20.1	1.0	7.3	.2	5.8	2.8
Saline	31.5	--	--	--	--	5.6	8.3	3.4	1.6	4.7	--	.6	7.3
Schuyler	13.4	--	--	--	--	.3	3.4	4.3	.6	1.7	--	.6	2.5
Scotland	21.3	--	--	--	--	.3	4.3	6.5	1.3	4.0	--	1.0	3.9
Scott	18.0	--	--	--	--	.5	6.5	4.7	1.7	2.5	.1	1.7	.3
Shannon	477.0	8.3	1.1	2.3	25.2	88.3	227.3	97.8	1.1	5.3	--	5.8	14.5
Shelby	34.9	--	--	--	--	.8	8.4	12.1	1.7	5.6	--	1.4	4.9
Stoddard	46.1	--	--	--	--	1.4	13.6	8.2	9.0	9.3	.2	3.6	.8
Stone	124.1	.3	.9	9.4	2.9	36.8	45.7	16.9	--	2.0	--	.6	8.6
Sullivan	38.5	--	--	--	--	.8	9.4	12.3	1.9	5.8	--	2.2	6.1
Taney	197.5	--	4.3	28.1	3.4	58.4	62.9	22.9	--	.9	--	1.3	15.3
Texas	373.6	6.8	1.4	4.6	12.9	118.8	151.3	46.9	--	2.7	--	2.4	25.8
Vernon	63.7	--	--	--	--	7.5	15.2	8.2	4.5	13.9	--	1.8	12.6
Warren	123.5	--	2.8	6.5	--	16.4	27.1	44.6	1.9	10.6	.2	7.1	6.3
Washington	355.0	10.3	1.1	2.1	16.8	59.1	165.7	75.6	.4	5.8	--	6.9	11.2
Wayne	338.3	13.6	1.1	1.9	20.4	54.5	153.7	70.1	1.6	6.2	--	5.3	9.9
Webster	120.2	--	.1	2.1	2.5	38.7	50.1	15.2	--	2.5	--	.6	8.4
Worth	12.4	--	--	--	--	.3	3.1	3.8	.7	1.9	--	.6	2.0
Wright	161.5	.2	.6	2.5	3.9	52.0	63.7	20.3	--	4.6	--	1.2	12.5
Total	12,364.7	116.0	88.3	259.4	281.1	2,488.2	4,409.4	2,644.5	177.7	660.6	4.8	310.8	923.9

1/ Counties in western and northern Missouri contain only bottomland oaks -- no gum or cypress.

Table 35.--*Area of noncommercial forest land by ownership class, Missouri, 1972*

(In thousand acres)

Ownership class	All areas	Productive reserved areas	Unproductive areas
National forest	30.6	--	30.6
Other public	266.3	256.1	10.2
Forest industry	3.6	--	3.6
Farmer and miscellaneous private	253.9	--	253.9
All ownerships	554.4	256.1	298.3

Table 35a.--*Area of commercial forest land, by ownership class, Missouri, 1972*

Ownership class	Thousand acres
National Forest	1,321.8
Other Federal	
Indian	.3
Miscellaneous Federal	66.9
Total other Federal	67.2
State	186.8
County and municipal	32.2
Forest industry 1/	362.3
Farmer-owned	6,136.8
Miscellaneous private	
Individual	3,625.8
Corporate	631.8
Total miscellaneous private	4,257.6
All ownerships	12,364.7

1/ Not including 261 thousand acres of farmer-owned and miscellaneous private lands leased to forest industry.

Table 36.--*Number of all live trees on commercial forest land by species and diameter class, Missouri, 1972*

(In thousand trees)

Species	All classes	Diameter class (inches at breast height)													
		1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods:															
Shortleaf pine	156689	66850	38048	22137	14891	8564	4435	1235	325	155	49	--	--	--	--
Cypress	255	--	--	--	17	35	15	47	32	44	17	20	16	12	--
Eastern redcedar	179641	117248	38908	13398	6231	2711	836	181	123	--	5	--	--	--	--
Total softwoods	336585	184098	76956	35535	21139	11310	5286	1463	480	199	71	20	16	12	--
Hardwoods:															
Select white oaks	1006149	517391	191715	109888	73012	47613	29423	19471	8843	3973	2037	1130	1371	280	2
Other white oaks	876134	441731	206134	107462	50697	32072	18283	10451	4896	2158	1214	559	449	28	--
Select red oaks	109063	51407	16569	10646	9628	7588	4451	3489	2259	1279	700	391	560	90	6
Red oaks	1156199	625719	219301	112020	76005	53885	33012	17506	9305	4296	2336	1325	1273	215	1
Other red oaks	351776	208391	68242	33371	18489	11057	5752	3096	1663	930	439	143	165	33	5
Hickory A	509452	337882	92130	41128	18503	10414	5176	2361	850	575	251	66	103	13	--
Hickory B	756971	546620	123422	45982	21997	11018	4770	1865	914	251	88	15	28	1	--
Hard maple	96795	67166	15955	6178	3529	1964	911	550	224	155	64	58	34	7	--
Soft maple	86500	68715	7836	3777	1575	1682	1131	630	488	179	138	132	154	52	11
Beech	615	360	193	--	--	11	19	7	10	3	3	6	2	1	--
Sweetgum	5137	2024	1830	388	258	299	173	65	48	29	13	--	8	2	--
Tupelo and blackgum	98564	78352	11271	4356	1436	1028	849	455	466	197	57	49	38	10	--
Ash	177406	108459	35132	16135	8500	4799	2489	1034	333	295	74	78	63	15	--
Sycamore	17476	5953	2298	2603	1861	1378	1139	745	593	330	184	145	184	54	9
Cottonwood	5366	2321	176	529	663	329	325	276	234	163	104	67	110	58	11
River birch	8507	1635	2162	2326	968	485	307	296	131	93	39	20	29	11	5
Yellow-poplar	122	--	--	60	19	10	22	4	--	--	3	--	--	4	--
Basswood	5408	3005	494	492	427	462	253	120	51	50	16	17	13	8	--
Black walnut	66088	24955	12989	10423	8328	4133	2599	1402	753	315	119	31	41	--	--
Black cherry	25997	15381	5790	2532	1307	418	258	155	104	12	36	--	4	--	--
Elm	415044	289090	76506	27933	11658	5013	2412	1156	521	312	206	84	117	36	--
Other hardwoods	947443	789621	103546	27340	13115	6528	3398	1797	1053	440	280	122	168	35	--
Noncommercial species	274623	243676	25903	4411	477	104	45	--	--	7	--	--	--	--	--
Total hardwoods	6996835	4429854	1219594	569980	322452	202290	117197	66931	33739	16042	8401	4438	4914	953	50
All species	7333420	4613952	1296550	605515	343591	213600	122483	68394	34219	16241	8472	4458	4930	965	50

Table 37.--*Number of growing-stock trees on commercial forest land by species and diameter class, Missouri, 1972*

(In thousand trees)

Species	All classes	Diameter class (inches at breast height)													
		1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods:															
Shortleaf pine	123875	44532	29929	20317	14550	8470	4370	1193	325	146	43	--	--	--	--
Cypress	171	--	--	--	17	--	--	31	28	38	17	18	13	7	2
Eastern redcedar	139360	92811	31417	9033	3977	1495	471	93	63	--	--	--	--	--	--
Total softwoods	263406	137343	61346	29350	18544	9965	4841	1317	416	184	60	18	13	7	2
Hardwoods:															
Select white oaks	525505	204050	127339	71437	49481	31829	19572	13008	5045	1996	871	417	370	88	2
Other white oaks	367128	144035	97511	63227	30556	16356	8463	4525	1681	551	130	65	28	--	--
Select red oaks	59946	22224	11454	6877	6400	5032	2800	2231	1385	749	289	186	279	40	--
Red oaks	661947	302004	147735	80426	52886	36511	21682	11391	5384	2097	1036	376	362	56	1
Other red oaks	87526	41155	21423	12099	5901	3399	1392	962	547	345	166	52	62	23	--
Hickory A	222849	115009	56076	27742	11648	6173	3225	1691	574	428	158	46	69	10	--
Hickory B	281847	162981	66478	27756	13179	6767	2731	1217	552	107	50	7	22	--	--
Hard maple	43180	28497	8141	3223	1603	907	487	225	59	23	--	9	3	3	--
Soft maple	27436	20539	2236	1752	678	724	547	379	280	78	82	75	55	11	--
Beech	202	--	192	--	--	--	--	--	10	--	--	--	--	--	--
Sweetgum	1935	463	686	169	161	245	117	23	48	22	--	--	1	--	--
Tupelo and blackgum	27586	17791	5057	2309	909	538	395	191	285	79	--	17	11	4	--
Ash	42289	19295	7627	6803	3843	2341	1321	610	193	135	28	42	40	11	--
Sycamore	12064	2656	2067	2042	1300	1178	1003	622	475	297	141	119	137	25	2
Cottonwood	3660	1084	176	414	547	270	240	259	219	164	88	62	89	45	3
River birch	4615	250	993	1632	816	408	212	144	65	45	23	9	11	3	4
Yellow-poplar	86	--	--	23	19	10	22	4	--	--	4	--	--	4	--
Basswood	2140	956	495	--	217	186	148	83	37	18	--	--	--	--	--
Black walnut	20453	2130	4237	5002	4302	2093	1283	769	408	162	50	17	--	--	--
Black cherry	4025	658	2202	523	299	88	111	115	13	12	--	--	4	--	--
Elm	69389	36670	15528	8826	4393	2178	993	413	174	116	30	18	44	5	1
Other hardwoods	108904	73088	17738	7720	4282	2807	1585	912	452	155	90	32	43	--	--
Total hardwoods	2574712	1195535	595391	330002	193420	120040	68329	39774	17886	7579	3236	1549	1630	328	13
All species	2838118	1332878	656737	359352	211964	130005	73170	41091	18302	7763	3296	1567	1643	335	15

Table 38.--*Number of growing-stock trees on commercial forest land by species groups and Forest Survey Unit, Missouri, 1972*

ALL UNITS

Species group	All classes	Diameter class (inches at breast height)													
		1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods	263,406	137,343	61,346	29,350	18,544	9,965	4,841	1,317	416	184	60	18	13	7	2
Hardwoods	2,574,712	1,195,535	595,391	330,002	193,420	120,040	68,329	39,774	17,886	7,579	3,236	1,549	1,630	328	13
All species	2,838,118	1,332,878	656,737	359,352	211,964	130,005	73,170	41,091	18,302	7,763	3,296	1,567	1,643	335	15
EASTERN OZARKS															
Softwoods	111,711	45,599	24,806	17,042	12,302	7,122	3,507	877	324	96	36	--	--	--	--
Hardwoods	1,127,432	575,358	262,547	122,215	71,446	47,409	26,396	13,356	5,673	1,780	722	257	242	30	1
All species	1,239,143	620,957	287,353	139,257	83,748	54,531	29,903	14,233	5,997	1,876	758	257	242	30	1
NORTHWESTERN OZARKS															
Softwoods	20,812	17,471	1,854	793	317	153	132	52	14	26	--	--	--	--	--
Hardwoods	318,882	149,207	65,302	45,566	26,493	15,138	7,871	5,379	2,238	942	347	204	157	38	--
All species	339,694	166,678	67,156	46,359	26,810	15,291	8,003	5,431	2,252	968	347	204	157	38	--
SOUTHWESTERN OZARKS															
Softwoods	80,751	47,363	20,806	6,441	3,258	1,650	915	267	20	24	7	--	--	--	--
Hardwoods	462,668	239,646	105,608	52,128	27,987	16,581	10,283	6,120	2,600	926	431	178	164	16	--
All species	543,419	287,009	126,414	58,569	31,245	18,231	11,198	6,387	2,620	950	438	178	164	16	--
PRAIRIE															
Softwoods	2,405	1,809	--	286	117	133	34	16	10	--	--	--	--	--	--
Hardwoods	268,167	75,999	70,789	55,584	28,049	15,951	8,336	6,241	3,255	1,819	856	473	642	165	8
All species	270,572	77,808	70,789	55,870	28,166	16,084	8,370	6,257	3,265	1,819	856	473	642	165	8
RIVERBORDER															
Softwoods	47,727	25,101	13,880	4,788	2,550	907	253	105	48	38	17	18	13	7	2
Hardwoods	397,563	155,325	91,145	54,509	39,445	24,961	15,443	8,678	4,120	2,112	880	437	425	79	4
All species	445,290	180,426	105,025	59,297	41,995	25,868	15,696	8,783	4,168	2,150	897	455	438	86	6

Table 39.--*Number of short-log trees on commercial forest land by species and diameter class, Missouri, 1972*

(In thousand trees)

Species	All classes	Diameter class (inches at breast height)								
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0+
Softwoods:										
Shortleaf pine	30	--	21	--	--	9	--	--	--	--
Cypress	24	19	--	--	--	--	--	2	3	--
Eastern redcedar	572	429	103	27	13	--	--	--	--	--
Total softwoods	626	448	124	27	13	9	--	2	3	--
Hardwoods:										
Select white oaks	9,065	--	3,781	2,580	1,324	625	318	206	186	45
Other white oaks	5,063	--	2,587	1,560	596	217	59	28	13	3
Select red oaks	920	--	320	247	167	48	43	27	49	19
Red oaks	5,965	--	2,915	1,414	951	304	158	105	93	25
Other red oaks	1,382	--	826	252	97	133	23	14	35	2
Hickory A	1,003	--	500	254	137	72	14	6	20	--
Hickory B	1,067	--	729	178	127	32	--	--	--	1
Hard maple	209	--	48	70	66	--	21	4	--	--
Soft maple	369	--	115	81	64	36	25	20	26	2
Sweetgum	14	--	--	14	--	--	--	--	--	--
Tupelo and blackgum	285	--	183	55	12	25	--	6	4	--
Ash	514	--	307	162	--	38	4	3	--	--
Sycamore	148	--	35	58	14	--	9	8	15	9
Cottonwood	36	--	--	16	--	--	7	--	8	5
River birch	122	--	14	88	8	--	--	12	--	--
Basswood	24	--	--	--	14	--	7	--	--	3
Black walnut	912	--	434	252	154	47	9	--	16	--
Black cherry	63	--	--	18	25	--	20	--	--	--
Elm	772	--	345	234	85	42	36	5	20	5
Other hardwoods	617	--	304	150	55	50	28	13	11	6
Total hardwoods	28,550	--	13,443	7,683	3,896	1,669	781	457	496	125
All species	29,176	448	13,567	7,710	3,909	1,678	781	459	499	125

Table 40.--*Net volume of growing stock and sawtimber on commercial forest land by species, Missouri, 1959 and 1972*

Species	Growing stock		Sawtimber	
	1959[1]	1972	1959[1]	1972
	Million cubic feet		*Million board feet*[2]	
Softwoods:				
Shortleaf pine	249.0	305.0	625.7	1,032.4
Cypress	15.7	7.4	77.4	34.4
Eastern redcedar	25.4	56.4	34.1	113.2
Other softwoods	1.4	--	8.4	--
Total softwoods	291.5	368.8	745.6	1,180.0
Hardwoods:				
Select white oak	1,519.2	1,539.7	3,671.2	3,921.0
Other white oak	708.9	650.2	1,403.6	1,156.8
Select red oaks	344.7	299.9	1,212.2	1,010.6
Red oaks	1,330.3	1,620.0	2,984.6	4,104.6
Other red oaks	139.4	160.6	387.8	428.6
Hickory A	315.6	296.1	564.4	615.9
Hickory B	192.9	258.7	280.0	413.1
Hard maple	43.2	38.4	67.2	56.4
Soft maple	58.7	62.4	157.5	206.3
Beech	0.4	0.3	1.6	1.3
Sweetgum	11.8	8.0	33.4	23.4
Tupelo and blackgum	23.7	33.9	78.9	99.4
Ash	107.6	103.9	221.1	215.3
Sycamore	71.5	125.0	214.2	473.4
Cottonwood	43.2	65.3	194.4	306.9
River birch	11.0	26.0	30.1	66.4
Yellow poplar	0.2	1.6	0.6	4.6
Basswood	4.1	6.5	6.2	18.4
Black walnut	100.2	96.9	238.3	216.9
Black cherry	10.6	8.2	13.5	22.0
Elm	240.5	93.0	542.9	153.4
Other hardwoods	147.7	138.1	292.6	360.2
Total hardwoods	5,425.4	5,632.7	12,596.3	13,874.9
All species	5,716.9	6,001.5	13,341.9	15,054.9

[1]Figures have been adjusted from those published previously for 1959 to conform to 1972 volumes because of changes in survey definitions and procedures.

[2]International ¼-inch rule.

Table 41.--*Net volume of timber on commercial forest land by class of timber and softwoods and hardwoods, Missouri, 1972*

(In million cubic feet)

Class of timber	All species	Softwoods	Hardwoods
Growing stock trees:			
Saw log trees:			
Saw log portion	2,147.1	168.3	1,978.8
Upper stem portion	904.6	43.3	861.3
Total sawtimber	3,051.7	211.6	2,840.1
Poletimber trees	2,949.8	157.2	2,792.6
Total growing stock	6,001.5	368.8	5,632.7
Cull trees:			
Rough cull trees:			
Sawtimber	759.1	8.1	751.0
Poletimber	1,298.8	16.7	1,282.1
Total rough cull	2,057.9	24.8	2,033.1
Short log cull trees:			
Sawtimber	484.4	5.0	479.4
Poletimber	1.1	--	1.1
Total short log	485.5	5.0	480.5
Rotten cull trees:			
Sawtimber	298.3	2.8	295.5
Poletimber	158.1	1.5	156.6
Total rotten cull	456.4	4.3	452.1
Total cull	2,999.8	34.1	2,965.7
Salvable dead trees:			
Sawtimber	89.9	6.9	83.0
Poletimber	51.1	3.3	47.8
Total salvable dead	141.0	10.2	130.8
All classes	9,142.3	413.1	8,729.2

Table 42.--*Net volume of growing stock and sawtimber on commercial forest land by ownership class and species group, Missouri, 1972*

Ownership class	All species	Shortleaf pine	Other softwoods	Soft hardwoods	Hard hardwoods
GROWING STOCK (In million cubic feet)					
National Forest	831.9	163.0	3.6	18.9	646.4
Other Federal	39.2	0.2	0.2	23.7	15.1
State, county, and municipal	124.8	7.9	2.9	7.7	106.3
Forest industry	165.2	19.1	0.4	20.6	125.1
Farmer and miscellaneous private	4,840.4	114.8	56.7	444.7	4,224.2
All ownerships	6,001.5	305.0	63.8	515.6	5,117.1
SAWTIMBER (In million board feet[1])					
National Forest	2,187.4	629.9	6.4	43.5	1,507.6
Other Federal	115.6	1.2	1.4	71.6	41.4
State, county, and municipal	325.7	23.9	11.1	15.2	275.5
Forest industry	402.1	31.3	0.2	41.8	328.8
Farmer and miscellaneous private	12,024.1	346.1	128.5	1,447.6	10,101.9
All ownerships	15,054.9	1,032.4	147.6	1,619.7	12,255.2

[1]International ¼-inch rule.

Table 43.--*Net volume of growing stock on commercial forest land by species and diameter class, Missouri, 1972*

(In million cubic feet)

Species	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods													
Shortleaf pine	305.0	47.6	74.1	79.8	62.5	24.2	9.5	5.4	1.9	--	--	--	--
Cypress	7.4	--	0.1	--	--	0.5	0.7	1.4	0.9	1.2	1.3	1.0	0.3
Eastern redcedar	56.4	18.0	17.4	12.1	5.8	1.6	1.5	--	--	--	--	--	--
Total softwoods	368.8	65.6	91.6	91.9	68.3	26.3	11.7	6.8	2.8	1.2	1.3	1.0	0.3
Hardwoods													
Select white oaks	1,539.7	196.1	255.2	280.5	270.8	247.7	131.8	67.8	35.6	20.7	24.0	9.3	0.2
Other white oaks	650.2	150.4	141.7	124.7	97.7	73.8	36.8	15.1	5.0	3.2	1.8	--	--
Select red oaks	299.9	19.9	31.4	44.5	38.3	45.6	37.8	26.1	13.6	12.5	24.6	5.6	--
Red oaks	1,620.0	198.9	270.6	323.1	293.2	220.2	140.6	72.3	43.8	18.7	25.0	5.8	7.8
Other red oaks	160.6	24.8	25.8	26.0	16.4	18.2	15.0	14.2	8.0	3.3	5.5	3.4	--
Hickory A	296.1	62.5	55.5	51.6	45.9	35.3	15.4	15.1	6.5	2.8	4.3	1.2	--
Hickory B	258.7	58.1	60.1	56.4	37.1	23.7	14.9	3.8	2.4	0.5	1.7	--	--
Hard maple	38.4	7.9	8.1	8.3	6.8	4.0	1.6	0.7	--	0.4	0.3	0.3	--
Soft maple	62.4	5.0	4.7	8.0	8.7	8.6	8.8	2.8	4.5	4.8	4.9	1.6	--
Beech	0.3	--	--	--	--	--	0.3	--	--	--	--	--	--
Sweetgum	8.0	0.3	0.8	2.5	1.6	0.4	1.5	0.7	--	--	0.2	--	--
Tupelo and blackgum	33.9	5.0	4.4	4.6	4.7	3.6	7.1	2.6	--	0.8	0.6	0.5	--
Ash	103.9	15.8	19.0	21.2	17.5	12.2	5.4	4.9	1.3	2.1	2.7	1.8	--
Sycamore	125.0	5.9	7.7	12.4	16.9	15.0	16.5	13.4	8.0	8.6	15.2	4.8	0.6
Cottonwood	65.3	1.0	3.1	2.9	4.6	6.5	7.6	7.9	6.1	4.7	9.7	9.8	1.4
River birch	26.0	4.3	4.3	3.5	3.2	3.2	1.8	1.7	1.1	0.5	1.1	0.5	0.8
Yellow poplar	1.6	0.1	--	0.1	0.4	0.1	--	--	0.1	--	0.2	0.6	--
Basswood	6.5	--	0.8	1.3	1.7	1.3	0.8	0.6	--	--	--	--	--
Black walnut	96.9	11.8	20.3	17.2	16.7	14.3	8.9	5.2	1.9	0.6	--	--	--
Black cherry	8.2	1.1	1.4	0.7	1.9	2.0	0.4	0.4	--	--	0.3	--	--
Elm	93.0	20.4	19.6	17.4	12.8	6.8	4.9	4.4	1.3	0.9	3.4	0.5	0.6
Other hardwoods	138.1	16.1	19.8	26.5	24.2	20.7	13.6	7.9	4.8	1.7	2.8	--	--
Total hardwoods	5,632.7	805.4	954.3	1,033.4	921.1	763.2	471.5	267.6	144.0	86.8	128.3	45.7	11.4
All species	6,001.5	871.0	1,045.9	1,125.3	989.4	789.5	483.2	274.4	146.8	88.0	129.6	46.7	11.7

Table 44.--*Net volume of sawtimber on commercial forest land by species and diameter class, Missouri, 1972*

(In million board feet[1])

Species	All classes	Diameter class (inches at breast height)									
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods:											
Shortleaf pine	1,032.4	434.0	351.2	144.3	56.9	33.0	13.0	--	--	--	--
Cypress	34.4	--	--	2.3	3.5	7.0	4.6	5.7	5.8	4.5	1.0
Eastern redcedar	113.2	63.7	32.0	9.1	8.4	--	--	--	--	--	--
Total softwoods	1,180.0	497.7	383.2	155.7	68.8	40.0	17.6	5.7	5.8	4.5	1.0
Hardwoods:											
Select white oaks	3,921.0	--	1,335.9	1,206.0	635.6	317.8	170.1	97.2	117.0	40.5	.9
Other white oaks	1,156.8	--	496.1	366.5	175.8	74.2	23.2	13.9	7.1	--	--
Select red oaks	1,010.6	--	181.6	233.0	185.6	138.3	68.9	58.6	114.2	30.4	--
Red oaks	4,104.6	--	1,469.4	1,108.4	714.9	360.0	218.0	96.5	112.6	24.5	.3
Other red oaks	428.6	--	85.8	93.6	79.3	75.1	41.4	15.6	25.1	12.7	--
Hickory A	615.9	--	230.8	165.8	74.0	69.8	31.9	13.7	23.9	6.0	--
Hickory B	413.1	--	186.1	112.9	73.7	17.8	10.3	2.7	9.6	--	--
Hard maple	56.4	--	26.5	16.2	7.4	2.4	--	1.9	1.0	1.0	--
Soft maple	206.3	--	44.5	43.1	41.3	12.2	20.0	19.8	20.1	5.3	--
Beech	1.3	--	--	--	1.3	--	--	--	--	--	--
Sweetgum	23.4	--	7.8	2.1	7.3	5.0	--	--	1.2	--	--
Tupelo and blackgum	99.4	--	21.6	16.9	36.2	12.8	--	4.3	4.3	3.3	--
Ash	215.3	--	70.5	53.0	26.2	23.4	5.6	10.2	16.9	9.5	--
Sycamore	473.4	--	68.9	67.8	77.5	65.8	38.9	46.7	80.5	24.5	2.8
Cottonwood	306.9	--	23.0	35.2	40.3	41.8	31.7	25.8	51.9	50.6	6.6
River birch	66.4	--	14.3	14.6	8.3	9.6	7.4	3.2	4.1	2.5	2.4
Yellow-poplar	4.6	--	2.0	.5	--	--	.7	--	--	1.4	--
Basswood	18.4	--	7.3	5.4	3.3	2.4	--	--	--	--	--
Black walnut	216.9	--	72.3	65.4	42.5	26.0	8.0	2.7	--	--	--
Black cherry	22.0	--	7.0	9.4	1.7	2.0	--	--	1.9	--	--
Elm	153.4	--	55.1	29.7	21.5	19.8	5.5	4.2	15.1	1.9	.6
Other hardwoods	360.2	--	108.7	100.7	70.2	35.7	24.4	8.4	12.1	--	--
Total hardwoods	13,874.9	--	4,515.2	3,746.2	2,323.9	1,311.9	706.0	425.4	618.6	214.1	13.6
All species	15,054.9	497.7	4,898.4	3,901.9	2,392.7	1,351.9	723.6	431.1	624.4	218.6	14.6

1/ International 1/4-inch rule.

Table 45.--*Net volume of growing stock on commercial forest land by species and Forest Survey Unit, Missouri, 1972*

(In million cubic feet)

SPECIES	ALL UNITS	EASTERN OZARKS	SOUTHWESTERN OZARKS	NORTHWESTERN OZARKS	PRAIRIE	RIVERBORDER
SOFTWOODS:						
SHORTLEAF PINE	305.0	245.2	54.3	4.2	--	1.3
CYPRESS	7.4	--	--	--	--	7.4
EASTERN REDCEDAR	56.4	8.6	9.5	3.8	3.5	31.0
TOTAL SOFTWOODS	368.8	253.8	63.8	8.0	3.5	39.7
HARDWOODS:						
SELECT WHITE OAKS	1,539.7	500.4	150.6	184.6	242.9	461.2
OTHER WHITE OAKS	650.2	179.3	138.9	132.2	59.9	139.9
SELECT RED OAKS	299.9	66.4	49.2	31.3	58.5	94.5
RED OAKS	1,620.0	861.0	297.3	196.8	101.6	163.3
OTHER RED OAKS	160.6	42.0	22.6	13.9	66.8	15.3
HICKORY A	296.1	84.5	28.1	22.1	84.3	77.1
HICKORY B	258.7	108.6	46.3	29.2	24.5	50.1
HARD MAPLE	38.4	5.8	3.9	.3	5.3	23.1
SOFT MAPLE	62.4	3.8	.3	3.0	44.2	11.1
BEECH	.3	--	--	--	--	.3
SWEETGUM	8.0	3.5	--	--	--	4.5
TUPELO AND BLACKGUM	33.9	16.3	6.0	2.9	--	8.7
ASH	103.9	10.2	10.8	5.8	32.0	45.1
SYCAMORE	125.0	23.4	8.1	28.0	31.4	34.1
COTTONWOOD	65.3	2.2	--	--	29.5	33.6
RIVER BIRCH	26.0	5.3	--	.5	17.7	2.5
YELLOW-POPLAR	1.6	--	--	--	--	1.6
BASSWOOD	6.5	--	.4	--	5.4	.7
BLACK WALNUT	96.9	14.7	13.3	9.3	37.8	21.8
BLACK CHERRY	8.2	1.6	.7	.7	2.6	2.6
ELM	93.0	22.1	6.9	4.3	33.2	26.5
OTHER HARDWOODS	138.1	10.7	3.9	5.9	41.1	76.5
TOTAL HARDWOODS	5,632.7	1,961.8	787.3	670.8	918.7	1,294.1
ALL SPECIES	6,001.5	2,215.6	851.1	678.8	922.2	1,333.8

Table 46.--*Net volume of sawtimber on commercial forest land by species and Forest Survey Unit, Missouri, 1972*

(In million board feet[1])

SPECIES	ALL UNITS	EASTERN OZARKS	SOUTHWESTERN OZARKS	NORTHWESTERN OZARKS	PRAIRIE	RIVERBOROER
SOFTWOODS:						
SHORTLEAF PINE	1,032.4	818.4	186.7	25.7	--	1.6
CYPRESS	34.4	--	--	--	--	34.4
EASTERN REDCEDAR	113.2	20.3	10.5	9.6	14.6	58.2
TOTAL SOFTWOODS	1,180.0	838.7	197.2	35.3	14.6	94.2
HARDWOODS:						
SELECT WHITE OAKS	3,921.0	1,005.1	379.6	488.1	685.6	1,362.6
OTHER WHITE OAKS	1,156.8	326.9	297.7	211.8	102.8	217.6
SELECT RED OAKS	1,010.6	179.8	164.6	96.8	202.8	366.6
RED OAKS	4,104.6	2,168.8	749.2	485.2	264.9	436.5
OTHER RED OAKS	428.6	115.8	48.6	30.6	192.3	41.3
HICKORY A	615.9	159.6	53.4	39.9	170.6	192.4
HICKORY B	413.1	205.1	71.0	34.0	15.4	87.6
HARD MAPLE	56.4	14.2	8.4	--	10.0	23.8
SOFT MAPLE	206.3	9.6	1.3	8.4	149.0	38.0
BEECH	1.3	--	--	--	--	1.3
SWEETGUM	23.4	4.3	--	--	--	19.1
TUPELO AND BLACKGUM	99.4	52.7	13.7	8.6	--	24.4
ASH	215.3	21.6	25.9	12.4	66.7	88.7
SYCAMORE	473.4	69.4	26.0	89.0	154.6	134.4
COTTONWOOD	306.9	9.7	--	--	137.5	159.7
RIVER BIRCH	66.4	17.2	--	3.2	36.2	9.8
YELLOW-POPLAR	4.6	--	--	--	--	4.6
BASSWOOD	18.4	--	--	--	14.9	3.5
BLACK WALNUT	216.9	22.7	26.2	18.3	98.0	51.7
BLACK CHERRY	22.0	4.9	2.7	2.0	3.6	8.8
ELM	153.4	37.3	10.1	5.9	58.1	42.0
OTHER HARDWOODS	360.2	23.1	9.6	14.6	80.4	232.5
TOTAL HARDWOODS	13,874.9	4,447.8	1,888.0	1,548.8	2,443.4	3,546.9
ALL SPECIES	15,054.9	5,286.5	2,085.2	1,584.1	2,458.0	3,641.1

1/ INTERNATIONAL 1/4-INCH RULE.

Table 47.--*Net volume of growing stock on commercial forest land by species and forest type, Missouri, 1972*

(In million cubic feet)

SPECIES	ALL FOREST TYPES	SHORTLEAF PINE	EASTERN REDCEDAR	EASTERN REDCEDAR-HARDWOOD	SHORTLEAF PINE-OAK	POST-BLACKJACK OAK	BLACK-SCARLET OAK
SOFTWOODS:							
SHORTLEAF PINE	305.0	82.1	--	0.2	93.1	16.4	80.8
CYPRESS	7.4	--	--	--	--	--	--
EASTERN REDCEDAR	56.4	.5	15.0	13.6	.3	4.7	7.1
TOTAL SOFTWOODS	368.8	82.6	15.0	13.8	93.4	21.1	87.9
HARDWOODS:							
SELECT WHITE OAKS	1,539.7	6.5	2.0	8.9	19.9	62.6	396.9
OTHER WHITE OAKS	650.2	1.7	.6	7.2	8.4	400.6	153.9
SELECT RED OAKS	299.9	.2	.3	3.9	3.4	11.1	149.8
RED OAKS	1,620.0	9.7	1.4	5.2	38.9	167.2	1,162.1
OTHER RED OAKS	160.6	.4	--	--	1.9	39.5	44.2
HICKORY A	296.1	--	.3	2.0	2.7	30.9	129.9
HICKORY B	258.7	1.3	--	1.5	3.5	64.6	108.4
HARD MAPLE	38.4	--	.1	--	--	.5	6.5
SOFT MAPLE	62.4	--	--	--	.2	.2	.6
BEECH	.3	--	--	--	--	--	.1
SWEETGUM	8.0	--	--	--	--	.2	1.9
TUPELO AND BLACKGUM	33.9	.7	--	--	1.0	.6	13.6
ASH	103.9	--	.2	2.1	--	4.9	16.6
SYCAMORE	125.0	--	.2	.9	--	1.1	14.4
COTTONWOOD	65.3	--	--	--	--	--	--
RIVER BIRCH	26.0	--	--	--	--	--	.2
YELLOW-POPLAR	1.6	--	--	--	--	--	.6
BASSWOOD	6.5	--	--	--	--	--	.9
BLACK WALNUT	96.9	--	.2	.9	.2	5.0	28.1
BLACK CHERRY	8.2	--	--	--	--	.7	3.4
ELM	93.0	.5	--	2.2	.1	5.4	17.1
OTHER HARDWOODS	138.1	--	.2	1.9	--	3.8	8.6
TOTAL HARDWOODS	5,632.7	21.0	5.5	36.7	80.2	798.9	2,257.8
ALL SPECIES	6,001.5	103.6	20.5	50.5	173.6	820.0	2,345.7

(TABLE 47 CONTINUED ON NEXT PAGE)

(TABLE 47 CONTINUED)

SPECIES	WHITE OAK	OAK-GUM-CYPRESS	ELM-ASH-COTTONWDOD	COTTON-WOOD	MAPLE-BEECH	NON-STOCKED
SOFTWOODS:						
SHORTLEAF PINE	29.2	--	1.4	--	D.3	1.5
CYPRESS	--	5.3	2.1	--	--	--
EASTERN REDCEDAR	7.5	.1	2.5	--	2.6	2.5
TOTAL SOFTWDDDS	36.7	5.4	6.0	--	2.9	4.D
HARDWOODS:						
SELECT WHITE OAKS	974.4	19.3	21.D	--	20.2	8.D
OTHER WHITE OAKS	63.5	1.1	3.D	--	2.0	8.2
SELECT RED OAKS	105.5	7.8	5.5	--	1D.6	1.8
RED DAKS	204.2	4.9	12.D	--	6.5	7.9
OTHER RED DAKS	9.4	43.3	17.1	--	2.3	2.5
HICKDRY A	86.D	13.1	20.6	--	7.5	3.1
HICKDRY B	58.1	4.7	5.4	--	9.9	1.3
HARD MAPLE	14.2	--	.2	--	16.6	.3
SDFT MAPLE	.7	1.8	57.9	--	.8	.2
BEECH	--	--	--	--	.2	--
SWEETGUM	.9	1.5	2.9	--	.6	--
TUPELO AND BLACKGUM	12.7	4.2	.4	--	.5	.2
ASH	24.5	4.0	46.2	.1	3.9	1.4
SYCAMORE	9.1	1.3	87.3	--	9.5	1.2
COTTONWOOD	2.9	.4	5D.2	9.0	.8	2.0
RIVER BIRCH	.7	4.9	19.9	--	.3	--
YELLDW-POPLAR	.5	--	--	--	.5	--
BASSWOOD	1.1	.5	2.5	--	1.5	--
BLACK WALNUT	28.9	1.6	18.8	--	8.7	4.5
BLACK CHERRY	1.7	--	2.0	--	.1	.3
ELM	21.3	2.9	24.9	--	16.3	2.3
DTHER HARDWOODS	11.8	7.5	91.6	.2	8.9	3.6
TOTAL HARDWODDS	1,632.1	124.8	489.4	9.3	128.2	48.8
ALL SPECIES	1,668.8	13D.2	495.4	9.3	131.1	52.8

Table 48.--*Net volume of sawtimber on commercial forest land by species and forest type, Missouri, 1972*

(In million board feet[1])

Species	All forest types	Shortleaf pine	Eastern redcedar	Eastern redcedar-hardwood	Shortleaf pine-oak	Post-blackjack oak	Black-scarlet oak	White oak	Oak-gum-cypress	Elm-ash-cotton-wood	Cotton-wood	Maple-beech	Non-stocked
Softwoods:													
Shortleaf pine	1,032.4	267.9	--	1.4	302.3	44.5	298.9	105.3	--	6.3	--	1.0	4.8
Cypress	34.4	--	--	--	--	--	--	--	24.7	9.7	--	--	--
Eastern redcedar	113.2	.7	31.5	16.4	.9	8.1	25.9	15.4	--	4.6	--	3.7	6.0
Total softwoods	1,180.0	268.6	31.5	17.8	303.2	52.6	324.8	120.7	24.7	20.6	--	4.7	10.8
Hardwoods:													
Select white oaks	3,921.0	14.5	4.3	21.3	47.2	154.6	964.2	2,499.8	62.7	69.2	--	61.9	21.3
Other white oaks	1,156.8	2.7	.7	20.8	10.6	633.5	335.9	124.6	1.7	8.2	--	2.5	15.6
Select red oaks	1,010.6	--	.9	10.0	4.4	37.5	496.6	350.9	39.5	23.2	--	41.8	5.8
Red oaks	4,104.6	18.2	2.4	11.6	79.3	366.6	2,992.7	543.1	24.3	31.9	--	19.2	15.3
Other red oaks	428.6	--	--	--	2.3	68.3	96.2	31.5	155.7	63.4	--	7.0	4.2
Hickory A	615.9	--	--	3.2	6.2	48.7	250.3	181.6	36.7	64.5	--	19.1	5.6
Hickory B	413.1	--	--	1.3	5.7	95.3	179.0	93.3	7.1	5.7	--	23.9	1.8
Hard maple	56.4	--	--	--	--	--	11.8	14.1	--	--	--	29.7	.8
Soft maple	206.3	--	--	--	--	--	--	--	7.0	193.9	--	4.2	1.2
Beech	1.3	--	--	--	--	--	.6	--	--	--	--	.7	--
Sweetgum	23.4	--	--	--	--	--	6.3	.9	4.4	11.1	--	.7	--
Tupelo and blackgum	99.4	1.4	--	--	1.2	1.5	40.4	37.8	14.4	.8	--	1.1	.8
Ash	215.3	--	.3	2.4	--	7.2	37.3	46.8	3.3	107.5	--	9.2	1.3
Sycamore	473.4	--	--	2.1	--	2.9	45.9	30.3	8.4	338.6	--	39.4	5.8
Cottonwood	306.9	--	--	--	--	--	--	12.9	1.9	242.8	38.4	3.8	7.1
River birch	66.4	--	--	--	--	--	1.0	--	11.3	53.1	--	1.0	--
Yellow-poplar	4.6	--	--	--	--	--	1.4	1.8	--	--	--	1.4	--
Basswood	18.4	--	--	--	--	--	2.1	3.2	2.2	5.6	--	5.3	--
Black walnut	216.9	--	1.3	.5	--	6.8	68.6	54.5	4.5	50.5	--	17.5	12.7
Black cherry	22.0	--	--	--	--	2.6	4.8	6.6	--	6.8	--	--	1.2
Elm	153.4	--	--	--	--	2.4	30.1	32.7	3.0	47.5	--	33.2	4.5
Other hardwoods	360.2	--	.8	4.0	--	5.6	14.9	22.3	17.9	272.3	--	17.0	5.4
Total hardwoods	13,874.9	36.8	10.7	77.2	156.9	1,433.5	5,580.1	4,088.7	406.0	1,596.6	38.4	339.6	110.4
All species	15,054.9	305.4	42.2	95.0	460.1	1,486.1	5,904.9	4,209.4	430.7	1,617.2	38.4	344.3	121.2

1/ International 1/4-inch rule.

Table 49.--*Net volume of sawtimber on commercial forest land by species and log grade class, Missouri, 1972*

(In million board feet[1])

SPECIES	ALL GRADES	LOG GRADE 1	LOG GRADE 2	LOG GRADE 3	TIE AND TIMBER
SOFTWOODS:					
SHORTLEAF PINE	1,032.4	148.7	145.4	738.3	--
CYPRESS	34.4	5.0	6.7	22.7	--
EASTERN REDCEDAR	113.2	.1	15.5	96.5	1.1
TOTAL SOFTWOODS	1,18D.0	153.8	167.6	857.5	1.1
HARDWOODS:					
SELECT WHITE OAKS	3,921.0	322.8	883.7	1,883.3	831.2
OTHER WHITE OAKS	1,156.8	38.7	139.7	724.3	254.1
SELECT RED OAKS	1,010.6	158.9	308.5	433.5	109.7
RED OAKS	4,104.6	195.1	959.4	1,99D.5	959.6
OTHER RED OAKS	428.6	16.9	42.9	122.1	246.7
HICKORY A	615.9	35.8	117.4	283.1	179.6
HICKORY B	413.1	13.5	65.1	196.1	138.4
HARD MAPLE	56.4	--	5.7	29.2	21.5
SOFT MAPLE	2D6.3	8.9	72.3	94.2	3D.9
BEECH	1.3	--	--	--	1.3
SWEETGUM	23.4	3.7	3.7	4.5	11.5
TUPELO AND BLACKGUM	99.4	5.6	55.5	9.3	29.0
ASH	215.3	6.2	1D4.8	103.2	1.1
SYCAMORE	473.4	137.9	136.6	178.7	20.2
CDTTONWDOD	306.9	44.2	53.1	170.6	39.D
RIVER BIRCH	66.4	10.3	23.3	23.8	9.0
YELLOW-POPLAR	4.6	.6	1.6	1.7	.7
BASSWOOD	18.4	--	5.9	11.2	1.3
BLACK WALNUT	216.9	20.7	54.8	14D.2	1.2
BLACK CHERRY	22.D	--	3.9	15.1	3.0
ELM	153.4	8.7	47.8	7D.7	26.2
OTHER HARDWOODS	36D.2	4D.4	78.9	12D.1	12D.8
TDTAL HARDWOODS	13,874.9	1,068.9	3,164.6	6,6D5.4	3,D36.0
ALL SPECIES	15,054.9	1,222.7	3,332.2	7,462.9	3,D37.1

1/ INTERNATIONAL 1/4-INCH RULE.

Table 50.--*Walnut volume on nonforest land by diameter class and class of timber, Missouri, 1972*

Diameter class (inches at breast height)	Growing stock	Sawtimber trees	Rough trees	Short-log trees	Rotten trees
	Thousand cubic feet	Thousand board feet[1/]	Thousand cubic feet	Thousand board feet[1/]	Thousand cubic feet
5.0-6.9	591.3	--	2,969.5	--	104.1
7.0-8.9	2,905.8	--	4,636.4	--	--
9.0-10.9	3,645.2	--	3,347.3	--	224.0
11.0-12.9	2,476.5	13,623.2	3,674.3	1,793.1	677.6
13.0-14.9	4,632.0	23,206.5	3,053.1	4,600.2	171.9
15.0-16.9	3,345.6	18,125.1	2,664.7	7,069.6	522.4
17.0-18.9	316.1	1,478.4	276.7	5,096.7	574.0
19.0-20.9	1,288.9	6,597.4	926.8	--	396.7
21.0-22.9	284.7	1,316.8	1,402.2	--	47.0
23.0-28.9	995.9	5,207.3	665.8	--	486.3
29.0-38.9	--	--	--	900.1	738.1
All diameters	20,482.0	69,554.7	23,616.8	19,459.7	3,942.1

1/ International 1/4-inch rule.

Table 51.--*Net volume of growing stock, sawtimber, and rough and rotten trees on commercial forest land by individual species, Missouri, 1972*

Species	Growing stock	Sawtimber	Rough and Rotten trees
	Million cubic feet	Million board feet[1/]	Million cubic feet
Softwoods:			
Shortleaf pine	305.0	1,032.4	5.9
Baldcypress	7.4	34.4	3.1
Eastern redcedar	56.4	113.2	25.1
Total softwoods	368.8	1,180.0	34.1
Hardwoods:			
Select white oak group			
White oak	1,425.2	3,610.3	543.3
Bur oak	19.7	60.5	24.1
Chinkapin oak	55.0	139.9	82.0
Overcup oak	5.2	14.1	2.4
Swamp chestnut oak	3.5	14.2	2.6
Swamp white oak	31.1	82.0	26.6
Other white oak group			
Post oak	650.2	1,156.8	480.4
Select red oak group			
Cherrybark oak	3.8	17.1	1.6
Northern red oak	288.4	958.6	101.5
Shumard oak	7.7	34.9	2.9
Red oak group			
Black oak	1,290.4	3,247.5	543.2
Scarlet oak	311.6	815.1	76.0
Southern red oak	18.0	42.0	7.0
Other red oak group			
Blackjack oak	64.4	114.2	147.1
Pin oak	58.4	209.9	25.7
Shingle oak	30.9	75.0	42.9
Water oak	.3	1.2	--
Willow oak	6.6	28.3	1.9
Hickory A group			
Mockernut hickory	134.8	276.7	56.3
Pecan	9.4	30.4	2.9
Shagbark hickory	118.8	232.3	46.3
Shellbark hickory	33.1	76.5	9.6
Hickory B group			
Bitternut hickory	33.8	36.1	16.0
Black hickory	58.2	91.8	17.1
Pignut hickory	166.4	283.5	85.7
Water hickory	.3	1.7	.3

(Table 51 continued on next page)

(Table 51 continued)

Species	Growing stock	Sawtimber	Rough and rotten trees
	Million cubic feet	Million board feet 1/	Million cubic feet
Hardwoods (cont.):			
Hard maple group			
Black maple	.2	--	--
Sugar maple	38.2	56.4	37.6
Soft maple group			
Red maple	2.6	1.4	3.7
Silver maple	59.8	204.9	59.2
American beech	.3	1.3	1.1
Sweetgum	8.0	23.4	3.0
Tupelo and blackgum group			
Blackgum	30.8	89.4	15.4
Black tupelo	2.9	9.0	2.6
Water tupelo	.2	1.0	.2
Ash group			
White ash	57.7	111.2	50.8
Green ash	44.1	100.3	21.9
Blue ash	2.1	3.8	1.7
Sycamore group			
American sycamore	125.0	473.4	20.6
Cottonwood group			
Eastern cottonwood	65.3	306.9	11.6
Birch group			
River birch	26.0	66.4	12.1
Yellow poplar	1.6	4.6	.1
Basswood group			
American basswood	6.5	18.4	8.3
Black walnut	96.9	216.9	71.3
Black cherry	8.2	22.0	15.7
Elm group			
American elm	60.2	103.4	96.6
Rock elm	5.4	6.1	6.3
Slippery elm	23.0	42.5	22.8
Winged elm	4.4	1.4	2.3
Other hardwoods			
Boxelder	6.1	20.5	16.0
Ohio buckeye	.6	--	2.0
Sugarberry	2.3	10.0	1.1
Hackberry	33.5	75.3	23.8
Flowering dogwood	.3	--	4.7
Common persimmon	3.8	1.3	6.4
Honeylocust	13.3	35.7	34.7
Kentucky coffeetree	4.6	13.4	2.5
Butternut	1.3	2.6	2.8
Red mulberry	1.3	4.6	12.2
Black locust	5.4	5.6	8.2
Sassafras	1.4	1.1	5.3
Northern catalpa	--	--	.2
Black willow	64.0	189.1	14.2
Osage orange	--	--	12.4
Cucumber tree	.2	1.0	--
Noncommercial	--	--	8.9
Total hardwoods	5,632.7	13,874.9	2,965.7
All species	6,001.5	15,054.9	2,999.8

1/ International 1/4-inch rule.

Table 52.--*Net volume of timber in rough, rotten, and short-log (cull) trees on commercial forest land by species and cull tree class, Missouri, 1972*

(In million cubic feet)

Species	All cull trees	Rough trees	Short-log trees[1/]	Rotten trees
Softwoods:				
Shortleaf pine	5.9	4.6	0.3	1.0
Cypress	3.1	.3	.6	2.2
Eastern redcedar	25.1	20.0	4.1	1.0
Total softwoods	34.1	24.9	5.0	4.2
Hardwoods:				
Select white oaks	681.0	445.7	161.8	73.5
Other white oaks	480.4	353.0	67.5	59.9
Select red oaks	106.0	59.6	18.3	28.1
Red oaks	626.2	401.1	100.2	124.9
Other red oaks	217.6	160.3	23.1	34.2
Hickory A	115.1	88.4	17.0	9.7
Hickory B	119.1	91.5	15.0	12.6
Hard maple	37.6	27.6	3.8	6.2
Soft maple	62.9	39.9	11.0	12.0
Beech	1.1	.8	--	.3
Sweetgum	3.0	2.0	.2	.8
Tupelo and blackgum	18.2	9.0	3.9	5.3
Ash	74.4	57.2	7.3	9.9
Sycamore	20.6	8.1	5.7	6.8
Cottonwood	11.6	4.8	1.7	5.1
River birch	12.1	6.4	2.5	3.2
Yellow-poplar	.1	.1	--	--
Basswood	8.3	4.9	.6	2.8
Black walnut	71.3	49.4	13.8	8.1
Black cherry	15.7	12.4	1.8	1.5
Elm	128.0	98.1	14.0	15.9
Other hardwoods	146.5	104.2	11.3	31.0
Noncommercial species	8.9	8.6	--	.3
Total hardwoods	2,965.7	2,033.1	480.5	452.1
All species	2,999.8	2,058.0	485.5	456.3

1/ Volumes are for trees 9.0 inches d.b.h. and larger for softwoods and 11.0 inches d.b.h. and larger for hardwoods. Volumes for rough and rotten trees are for trees 5.0 inches d.b.h. and larger.

Table 53.--*Net volume of short-log trees on commercial forest land by species and diameter class, Missouri, 1972*

(In million board feet[1])

Species	All classes	Diameter class (inches at breast height)									
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods:											
Shortleaf pine	2.5	--	1.1	--	--	1.4	--	--	--	--	--
Cypress	2.6	1.4	--	--	--	--	--	.4	.8	--	--
Eastern redcedar	20.1	13.4	5.4	1.0	.3	--	--	--	--	--	--
Total softwoods	25.2	14.8	6.5	1.0	.3	1.4	--	.4	.8	--	--
Hardwoods:											
Select white oaks	550.1	--	161.4	141.7	91.9	53.7	30.5	24.5	33.2	13.2	--
Other white oaks	253.2	--	105.7	83.1	36.8	17.0	5.3	3.1	1.7	.5	--
Select red oaks	55.7	--	10.9	12.6	10.5	2.9	4.3	3.8	6.8	3.6	.3
Red oaks	319.8	--	110.5	70.6	63.1	25.4	16.1	13.6	14.1	6.2	.2
Other red oaks	72.5	--	30.1	14.1	6.6	12.4	2.0	1.6	5.4	.3	--
Hickory A	59.6	--	21.9	13.3	9.1	7.2	1.9	1.2	5.0	--	--
Hickory B	44.7	--	26.6	8.4	7.8	1.6	--	--	--	.3	--
Hard maple	8.7	--	1.4	2.6	3.2	--	1.2	.3	--	--	--
Soft maple	24.4	--	4.0	4.3	4.7	2.9	2.1	1.8	3.9	--	.7
Sweetgum	.6	--	--	.6	--	--	--	--	--	--	--
Tupelo and blackgum	8.8	--	3.7	2.3	.5	1.2	--	.5	.6	--	--
Ash	16.2	--	7.6	6.2	--	1.9	.2	.3	--	--	--
Sycamore	10.1	--	.9	3.2	.2	--	.4	1.1	2.5	1.8	--
Cottonwood	3.5	--	--	1.0	--	--	.3	--	1.1	1.1	--
River birch	7.7	--	.7	4.7	.6	--	--	1.7	--	--	--
Basswood	1.8	--	--	--	.8	--	.6	--	--	.4	--
Black walnut	39.3	--	12.7	9.8	8.2	4.3	1.1	--	3.2	--	--
Black cherry	4.3	--	--	.3	2.0	--	2.0	--	--	--	--
Elm	35.2	--	11.5	9.1	4.9	2.3	2.5	.5	2.3	1.2	.9
Other hardwoods	27.2	--	6.9	7.3	3.2	3.0	2.3	1.0	1.9	1.6	--
Total hardwoods	1,543.4	--	516.5	395.2	254.1	135.8	72.8	55.0	81.7	30.2	2.1
All species	1,568.6	14.8	523.0	396.2	254.4	137.2	72.8	55.4	82.5	30.2	2.1

1/ International 1/4-inch rule.

Table 54.--*Cubic foot volume in all live trees by species and diameter class, Missouri, 1972*

(In million cubic feet)

Species	All classes	Diameter class (inches at breast height)											
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods:													
Shortleaf pine	310.9	51.1	75.4	80.3	62.8	24.3	9.5	5.5	2.0	--	--	--	--
Cypress	10.5	--	.1	.1	.3	1.0	1.1	2.0	.9	1.3	1.6	1.0	1.1
Eastern redcedar	81.4	23.8	25.1	18.4	8.8	2.8	2.5	--	--	--	--	--	--
Total softwoods	402.8	74.9	100.6	98.8	71.9	28.1	13.1	7.5	2.9	1.3	1.6	1.0	1.1
Hardwoods:													
Select white oaks	2,221.1	275.1	350.1	387.2	372.0	336.6	199.7	110.4	63.6	43.2	59.6	23.4	.2
Other white oaks	1,130.6	229.2	211.3	214.2	178.8	138.2	74.8	38.6	20.4	11.1	12.6	1.4	--
Select red oaks	406.4	28.4	43.6	60.4	52.4	59.6	49.5	33.6	19.8	16.9	32.8	8.7	.7
Red oaks	2,245.9	260.2	360.6	438.3	403.8	297.2	201.5	107.9	68.6	40.7	47.6	11.5	8.0
Other red oaks	378.3	59.0	66.9	66.8	53.1	39.8	31.0	24.9	15.0	6.1	10.7	4.1	.9
Hickory A	410.9	82.8	79.2	79.1	64.7	45.3	20.0	18.6	9.5	4.0	6.2	1.5	--
Hickory B	377.4	81.8	89.8	82.9	57.3	31.9	21.2	6.8	3.2	.6	1.8	.1	--
Hard maple	75.9	14.3	15.9	15.1	10.8	7.4	4.6	3.1	1.3	1.9	1.0	.5	--
Soft maple	125.1	12.6	10.5	16.8	17.5	13.7	14.2	5.8	6.1	7.3	10.3	6.6	3.7
Beech	1.4	--	--	--	.2	.1	.3	.1	.2	.4	.1	--	--
Sweetgum	11.3	.8	1.3	3.1	2.2	1.0	1.5	.9	.1	--	.3	.1	--
Tupelo and blackgum	52.3	9.2	6.0	7.4	8.8	5.6	8.6	3.6	.3	1.3	1.0	.5	--
Ash	178.9	35.4	36.6	36.0	28.5	17.0	7.0	7.8	2.4	2.9	3.4	1.9	--
Sycamore	145.4	7.1	10.1	14.1	18.0	17.3	18.7	14.1	9.2	9.4	18.4	7.3	1.7
Cottonwood	76.6	1.4	3.9	3.4	5.0	6.7	8.0	7.9	6.5	4.9	11.2	11.5	6.2
River birch	37.8	5.8	5.1	4.1	4.0	5.4	3.0	2.9	1.6	1.2	2.1	1.3	1.3
Yellow-poplar	1.6	.2	.1	.1	.4	.1	--	--	.1	--	--	.6	--
Basswood	14.9	1.5	1.9	2.9	2.3	1.8	1.0	1.2	.5	.7	.6	.5	--
Black walnut	168.1	23.4	35.4	28.9	28.0	22.4	14.5	8.3	4.1	1.1	2.0	--	--
Black cherry	23.6	6.0	5.9	2.7	2.9	2.6	1.7	.4	1.1	--	.3	--	--
Elm	220.8	57.9	47.4	35.0	25.5	16.6	11.3	9.2	5.3	3.1	6.1	1.9	1.5
Other hardwoods	284.7	52.7	49.8	48.5	39.5	30.9	22.2	13.8	10.3	4.8	8.1	4.1	--
Noncommercial species	8.9	6.4	1.6	.5	.3	--	--	.1	--	--	--	--	--
Total hardwoods	8,597.9	1,251.2	1,433.0	1,547.5	1,376.0	1,097.2	714.3	420.0	249.2	161.6	236.2	87.5	24.2
All species	9,000.7	1,326.1	1,533.6	1,646.3	1,447.9	1,125.3	727.4	427.5	252.1	162.9	237.8	88.5	25.3

Table 55.--*Net volume of growing stock and sawtimber on commercial forest land by county and species group, Missouri, 1972*

County	Growing stock							Sawtimber						
	All species	Soft-woods	White oak group	Red oak group	Hickory	Black walnut	Other hdwds	All species	Soft-woods	White oak group	Red oak group	Hickory	Black walnut	Other hdwds
	Thousand cords							*Million board feet*						
Adair	290.2	1.1	113.2	74.5	36.7	9.7	55.0	52.0	0.4	21.1	14.6	3.3	1.6	11.0
Andrew	79.4	0.3	25.4	19.2	9.3	3.1	22.1	15.6	0.1	4.9	4.0	1.0	0.5	5.1
Atchison	92.8	0.2	27.4	18.1	9.4	3.6	34.1	20.6	0.1	5.7	4.2	1.3	0.7	8.6
Audrain	191.0	0.4	50.9	35.6	18.0	8.0	78.1	42.4	0.2	10.8	8.1	2.4	1.5	19.4
Barry	863.6	78.7	288.1	369.8	72.9	13.1	41.0	166.8	17.3	53.8	76.6	9.6	2.0	7.5
Barton	138.6	0.4	32.2	38.0	18.7	7.6	41.7	32.5	0.1	7.1	10.2	3.7	1.9	9.5
Bates	288.7	0.9	64.7	79.1	38.8	14.4	90.8	67.8	0.3	14.4	20.9	7.5	3.5	21.2
Benton	755.6	7.6	347.9	263.9	56.0	10.1	70.1	144.4	2.7	62.9	54.8	6.7	1.6	15.7
Bollinger	1,387.0	114.3	433.4	616.5	124.7	10.1	88.0	275.7	30.3	72.0	133.6	19.7	1.3	18.8
Boone	793.4	21.0	371.0	164.8	74.7	15.1	146.8	164.5	3.0	74.9	38.2	12.0	2.9	33.5
Buchanan	112.4	0.3	27.5	21.7	10.7	5.9	46.3	23.5	0.1	5.6	4.8	1.4	1.1	10.5
Butler	1,257.6	181.1	323.6	531.2	95.6	8.1	118.0	261.5	48.5	50.8	120.6	15.0	0.9	25.7
Caldwell	109.9	0.3	27.6	20.7	10.6	4.7	46.0	24.9	0.1	6.1	4.8	1.5	0.9	11.5
Callaway	1,306.1	30.9	632.2	279.4	126.1	24.2	213.3	266.5	4.4	126.0	64.8	19.9	4.5	46.9
Camden	935.1	11.3	443.5	338.0	71.1	12.9	58.3	173.1	3.8	78.4	68.2	7.9	2.1	12.7
Cape Girardeau	717.8	15.7	358.2	141.0	66.6	12.8	123.5	156.5	2.5	77.1	34.7	11.5	2.5	28.2
Carroll	182.3	0.5	51.5	35.6	17.9	7.1	69.7	41.2	0.2	11.0	8.4	2.4	1.4	17.8
Carter	1,695.2	231.6	515.7	732.8	146.3	10.6	58.2	318.0	60.5	79.6	144.6	21.6	1.3	10.4
Cass	191.0	0.8	65.5	59.8	24.7	10.0	30.2	40.9	0.3	13.1	14.6	4.3	2.4	6.2
Cedar	324.1	2.8	147.0	112.3	24.3	4.5	33.2	62.8	1.0	26.9	23.6	3.0	0.6	7.7
Chariton	283.5	0.6	73.1	51.1	25.6	12.3	120.8	65.7	0.2	16.5	12.5	3.6	2.4	30.5
Christian	593.3	47.5	200.6	252.7	51.7	9.4	31.4	113.5	11.4	36.6	51.3	6.8	1.4	6.0
Clark	328.9	1.3	119.1	76.1	36.7	12.0	83.7	70.2	0.4	25.6	17.7	4.6	2.3	19.6
Clay	133.6	0.4	34.5	27.0	13.3	6.2	52.2	27.5	0.1	6.8	5.8	1.6	1.1	12.1
Clinton	124.7	0.3	26.1	22.3	10.9	5.4	59.7	28.0	0.1	5.6	4.9	1.3	1.0	15.1
Cole	535.0	17.2	255.8	113.7	50.6	9.5	88.2	107.2	2.6	50.6	25.9	7.8	1.7	18.6
Cooper	289.4	1.6	105.7	88.3	39.7	13.1	41.0	58.6	0.4	20.5	19.9	5.9	3.1	8.8
Crawford	2,195.8	178.1	696.7	981.7	198.5	15.3	125.5	412.1	46.8	108.5	198.5	29.7	1.9	26.7
Dade	208.5	1.4	73.8	62.9	30.1	10.1	30.2	39.9	0.4	13.7	13.5	4.1	2.3	5.9
Dallas	571.3	5.8	263.0	200.8	43.0	7.8	50.9	108.1	2.1	47.0	41.0	5.2	1.2	11.6
Davies	197.7	0.8	74.5	48.9	23.3	7.0	43.2	39.1	0.3	15.0	10.6	2.4	1.3	9.5
DeKalb	78.9	0.3	24.1	17.1	8.4	3.0	26.0	17.6	0.1	5.4	3.9	1.2	0.6	6.4
Dent	2,061.9	201.7	654.4	931.6	185.8	13.7	74.7	374.0	53.2	97.3	181.2	27.0	1.6	13.7
Douglas	1,157.8	105.6	387.0	495.7	99.8	17.2	52.5	226.4	27.4	71.6	101.6	13.2	2.7	9.9
Dunklin	269.8	24.1	19.2	35.1	18.7	0.7	172.0	75.2	8.7	4.2	11.2	5.5	0.2	45.4
Franklin	1,907.8	54.1	959.5	397.9	181.0	32.1	283.2	408.7	8.0	205.0	98.3	31.3	5.9	60.2
Gasconade	1,230.0	29.1	632.2	263.3	119.3	19.9	166.2	250.0	4.2	127.5	61.9	19.2	3.4	33.8
Gentry	138.2	0.5	45.5	33.4	16.3	5.3	37.2	26.7	0.2	8.7	6.8	1.8	0.9	8.3
Green	321.0	2.1	119.1	97.8	46.3	15.2	40.5	61.2	0.7	22.1	21.0	6.3	3.4	7.7
Grundy	149.3	0.5	48.2	31.4	15.2	6.1	47.9	33.6	0.2	10.7	7.6	2.2	1.2	11.7
Harrison	284.3	1.0	97.1	65.1	31.6	10.1	79.4	59.1	0.4	20.1	14.4	3.6	1.9	18.7
Henry	221.4	0.8	55.2	61.7	29.0	11.1	63.6	49.5	0.2	11.6	15.7	5.2	2.7	14.1
Hickory	456.5	4.3	211.6	160.5	35.0	6.4	38.7	87.3	1.6	38.2	33.2	4.2	0.9	9.2
Holt	101.3	0.3	27.3	20.9	10.4	4.9	37.5	20.1	0.1	5.3	4.3	1.2	0.8	8.4
Howard	429.0	13.3	196.2	90.2	40.0	8.4	80.9	90.2	2.0	40.6	21.3	6.6	1.6	18.1
Howell	1,303.2	104.3	440.7	571.9	111.7	18.5	56.1	260.6	25.7	83.6	122.3	15.1	3.1	10.8
Iron	2,009.4	198.8	634.9	906.5	177.3	13.3	78.6	364.8	49.4	95.3	177.3	26.1	1.6	15.1
Jackson	99.7	0.7	27.7	29.4	15.4	5.3	21.2	19.4	0.3	5.1	6.6	2.1	1.2	4.1
Jasper	263.5	0.9	77.0	77.5	35.5	14.0	58.6	60.0	0.3	16.6	20.0	6.6	3.3	13.2
Jefferson	1,675.1	49.0	864.3	362.7	162.2	27.3	209.6	349.9	7.2	181.1	87.9	27.3	4.8	41.6
Johnson	268.2	1.5	82.7	78.1	38.3	13.7	53.9	56.0	0.5	16.5	18.5	6.0	3.1	11.4
Knox	207.5	0.8	74.3	48.4	23.4	7.1	53.5	42.9	0.2	15.3	10.8	2.7	1.3	12.6
Lackde	843.0	10.3	399.4	303.5	63.6	11.7	54.5	152.6	3.5	68.5	60.0	7.0	2.0	11.6
Lafayette	126.9	0.4	31.6	35.8	16.8	6.2	36.1	29.9	0.1	7.1	9.4	3.2	1.6	8.5
Lawrence	297.7	1.6	114.1	93.3	40.9	13.8	34.0	62.0	0.5	23.3	21.7	6.2	3.2	7.1
Lewis	301.3	1.1	113.6	71.5	34.2	10.3	70.6	62.6	0.4	23.7	16.2	3.9	2.0	16.4
Lincoln	516.7	1.8	188.2	120.8	58.5	17.5	129.9	106.9	0.6	38.8	26.9	6.6	3.4	30.6

(Table 55 continued on next page)

(Table 55 continued)

County	Growing stock							Sawtimber						
	All species	Soft-woods	White oak group	Red oak group	Hickory	Black walnut	Other hdwds	All species	Soft-woods	White oak group	Red oak group	Hickory	Black walnut	Other hdwds
	Thousand cords							*Million board feet*						
Linn	179.5	0.4	44.3	32.0	15.8	8.8	78.2	41.1	0.1	10.0	7.8	2.3	1.6	19.3
Livingston	175.4	0.5	44.2	32.9	16.8	8.1	72.9	38.3	0.2	9.3	7.4	2.2	1.5	17.7
McDonald	817.2	39.1	283.9	369.7	73.7	12.3	38.5	157.8	9.9	52.2	76.4	9.9	2.1	7.3
Macon	388.3	1.5	147.1	96.8	46.1	13.4	83.4	74.9	0.5	29.2	20.7	4.7	2.2	17.6
Madison	1,621.1	235.8	477.3	680.6	133.4	10.6	83.4	303.2	58.4	73.6	132.6	19.8	1.2	17.6
Maries	603.9	6.8	290.1	219.3	46.2	8.1	33.4	104.1	2.5	48.4	40.5	4.8	1.2	6.7
Marion	269.4	1.0	103.4	65.4	31.8	9.0	58.8	53.3	0.3	20.6	14.1	3.3	1.7	13.3
Mercer	172.8	0.7	64.6	42.5	20.4	5.7	38.9	35.9	0.2	13.6	9.5	2.4	1.1	9.1
Miller	690.7	7.2	322.7	242.9	51.3	9.1	57.5	126.4	2.6	56.0	48.0	5.8	1.4	12.6
Mississippi	193.6	11.0	9.1	9.2	5.8	0.8	157.7	51.2	4.1	1.8	2.4	2.2	0.2	40.5
Moniteau	369.1	12.6	174.4	85.0	36.3	7.1	53.7	71.9	1.7	33.6	19.3	5.4	1.2	10.7
Monroe	318.1	1.1	110.8	70.6	34.3	11.9	89.4	68.2	0.4	23.6	16.3	4.2	2.3	21.4
Montgomery	760.8	18.3	342.9	154.8	70.6	15.6	158.6	159.6	3.0	68.2	35.7	11.1	3.1	38.5
Morgan	755.0	9.0	360.2	273.9	56.4	9.7	45.8	140.0	3.3	63.7	55.4	6.4	1.5	9.7
New Madrid	210.9	12.4	10.9	11.4	7.5	0.6	168.1	55.9	4.5	2.2	3.1	2.5	0.1	43.5
Newton	488.8	24.2	172.0	217.9	43.5	7.4	23.8	96.6	5.9	32.3	46.4	6.0	1.3	4.7
Nodaway	146.0	0.4	42.1	30.5	14.8	6.4	51.8	30.7	0.2	8.7	6.6	1.8	1.1	12.3
Oregon	1,988.0	243.6	612.2	860.0	177.0	13.0	82.2	378.5	65.0	97.0	172.3	26.7	1.6	15.9
Osage	1,219.8	35.9	587.5	266.7	117.0	22.1	190.6	248.8	5.0	117.4	62.1	18.5	4.1	41.7
Ozark	1,095.8	73.7	376.5	475.1	95.5	18.0	57.0	214.6	17.8	70.7	99.4	12.7	2.8	11.2
Pemiscot	176.9	11.9	10.3	11.4	8.3	0.6	134.4	46.8	4.3	1.6	2.9	2.5	0.1	35.4
Perry	830.8	20.1	414.0	173.0	79.0	14.2	130.5	176.4	3.0	87.6	42.3	13.3	2.6	27.6
Pettis	244.4	1.1	82.9	73.0	33.1	11.4	42.9	50.8	0.3	16.3	16.9	5.3	2.7	9.3
Phelps	957.7	15.1	454.0	358.2	71.8	12.6	46.0	168.1	5.4	75.3	68.6	7.5	2.1	9.2
Pike	594.0	2.2	216.8	139.5	67.4	20.3	147.8	123.2	0.7	44.8	31.1	7.7	3.9	35.0
Platte	171.0	0.5	49.3	39.8	19.6	8.0	53.8	30.0	0.2	8.1	7.4	2.0	1.3	11.0
Polk	368.2	7.0	162.4	125.1	27.2	5.6	40.9	69.2	2.1	28.1	25.3	3.3	1.0	9.4
Pulaski	772.1	8.1	361.7	278.5	59.3	10.7	53.8	138.7	2.9	61.5	54.2	6.6	1.6	11.9
Putnam	245.0	1.0	92.3	59.9	28.7	8.3	54.8	49.4	0.3	18.8	13.2	3.2	1.5	12.4
Ralls	295.8	1.1	112.4	70.0	33.6	10.4	68.3	62.3	0.4	24.0	16.0	4.1	2.0	15.8
Randolph	306.4	1.2	122.9	76.1	36.6	9.7	59.9	61.5	0.4	25.1	16.9	4.0	1.8	13.3
Ray	218.1	0.7	67.7	49.3	24.7	9.1	66.6	41.5	0.3	12.5	10.0	2.6	1.5	14.6
Reynolds	2,996.5	295.9	944.7	1,338.8	265.3	20.4	131.4	560.1	77.2	146.1	268.9	39.5	2.5	25.9
Ripley	1,848.6	272.4	539.7	768.9	154.4	11.8	101.4	350.0	71.6	82.2	151.3	22.6	1.4	20.9
St. Charles	786.6	15.3	330.6	134.5	66.1	17.0	223.1	182.2	2.7	72.9	33.1	11.9	3.8	57.8
St. Clair	557.6	5.0	246.5	188.5	42.1	8.2	67.3	109.3	1.8	45.0	39.8	5.5	1.1	16.1
St. Francois	863.8	77.4	269.1	378.7	78.9	6.1	53.6	158.6	19.2	41.2	74.9	11.7	0.7	10.9
St. Louis	500.7	15.9	218.4	97.6	45.6	10.7	112.5	111.4	2.3	47.3	24.0	7.9	2.3	27.6
Ste. Genevieve	1,140.1	35.5	580.4	253.6	115.1	18.4	137.1	227.6	4.0	117.6	60.5	17.5	3.0	25.0
Saline	175.1	0.8	52.3	50.9	23.4	8.4	39.3	37.8	0.2	10.6	12.4	3.9	2.0	8.7
Schuyler	76.4	0.3	27.7	17.7	8.7	2.7	19.3	15.8	0.1	5.7	4.0	1.0	0.5	4.5
Scotland	135.6	0.4	45.0	28.5	13.3	5.4	43.0	30.4	0.2	10.0	7.0	1.8	1.0	10.4
Scott	241.1	5.9	53.9	65.4	42.9	0.3	72.7	65.3	2.2	14.6	20.8	10.0	0.1	17.6
Shannon	3,169.6	346.8	992.9	1,412.1	282.0	20.7	115.1	584.2	90.7	151.7	277.3	41.6	2.5	20.4
Shelby	228.5	0.8	82.3	51.3	24.4	7.9	61.8	50.7	0.3	18.1	12.3	3.1	1.6	15.3
Stoddard	594.4	29.0	106.8	146.4	83.3	0.7	228.2	163.2	10.6	27.7	45.8	20.7	0.2	58.2
Stone	566.0	36.2	195.2	245.3	49.9	9.5	29.9	106.1	7.9	35.3	49.6	6.4	1.4	5.5
Sullivan	235.7	0.9	82.2	53.7	25.8	8.7	64.4	50.5	0.3	17.5	12.4	3.2	1.6	15.5
Taney	757.4	52.5	265.1	312.3	68.8	15.0	43.7	138.3	10.0	48.7	61.8	8.6	1.9	7.3
Texas	1,811.6	176.0	598.0	778.1	155.4	26.0	78.1	351.0	46.7	108.5	157.0	20.4	4.2	14.2
Vernon	403.9	1.0	97.8	113.2	54.2	19.6	118.1	98.2	0.3	22.7	30.9	11.1	5.0	28.2
Warren	995.1	25.3	482.8	200.5	92.1	17.6	176.8	212.1	4.2	100.7	48.2	15.4	3.4	40.2
Washington	2,533.4	308.0	780.2	1,091.1	220.3	17.1	116.7	484.7	82.1	123.3	221.1	33.1	2.2	22.9
Wayne	2,417.7	326.8	729.2	1,040.0	204.0	15.7	102.0	461.1	85.8	113.4	210.2	30.6	2.0	19.1
Webster	574.6	28.8	201.2	257.3	51.1	8.7	27.5	112.6	7.0	37.6	54.4	6.9	1.4	5.3
Worth	75.7	0.3	26.2	17.7	8.5	2.6	20.4	15.6	0.1	5.4	3.8	1.0	0.5	4.8
Wright	743.6	41.4	256.2	326.5	67.3	12.1	40.1	140.9	10.2	46.4	65.6	8.8	1.9	8.0
All counties	75,966.8	4,667.9	27,721.8	26,338.2	7,017.5	1,226.4	8,995.0	15,054.9	1,180.0	5,077.8	5,543.8	1,029.0	216.9	2,007.4

Table 56.--*Green weight of merchantable stem in all live trees by species and diameter class, Missouri, 1972*

(In million kilograms, green weight)

Species	All classes	Diameter class (inches at breast height)											
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods:													
Shortleaf pine	7,192	1,182	1,744	1,858	1,453	562	220	127	46	--	--	--	--
Cypress	237	--	2	2	7	23	25	45	20	29	36	23	25
Eastern redcedar	1,366	399	421	309	148	47	42	--	--	--	--	--	--
Total softwoods	8,795	1,581	2,167	2,169	1,608	632	287	172	66	29	36	23	25
Hardwoods:													
Select white oaks	64,478	7,986	10,164	11,240	10,799	9,772	5,797	3,205	1,846	1,254	1,730	679	6
Other white oaks	32,309	6,550	6,038	6,121	5,110	3,949	2,138	1,103	583	317	360	40	--
Select red oaks	11,982	837	1,286	1,781	1,545	1,757	1,459	991	584	498	967	256	21
Red oaks	63,161	7,318	10,141	12,326	11,356	8,358	5,667	3,034	1,929	1,145	1,339	323	225
Other red oaks	10,982	1,713	1,942	1,939	1,542	1,155	900	723	435	177	311	119	26
Hickory A	11,741	2,366	2,263	2,260	1,849	1,294	572	532	271	114	177	43	--
Hickory B	11,126	2,412	2,648	2,444	1,689	940	625	200	94	18	53	3	--
Hard maple	1,893	357	397	377	269	185	115	77	32	47	25	12	--
Soft maple	2,724	274	229	366	381	298	309	126	133	159	224	144	81
Beech	33	--	--	--	5	2	7	2	5	10	2	--	--
Sweetgum	256	18	29	71	50	23	34	20	2	--	7	2	--
Tupelo and blackgum	1,187	209	136	168	200	127	195	82	7	29	23	11	--
Ash	3,894	771	797	784	620	370	152	170	52	63	74	41	--
Sycamore	3,430	167	238	333	425	408	441	333	217	222	434	172	40
Cottonwood	1,704	31	87	76	111	149	178	176	144	109	249	256	138
River birch	789	121	106	86	83	113	63	61	33	25	44	27	27
Yellow-poplar	28	3	2	2	7	2	--	--	2	--	--	10	--
Basswood	276	28	35	54	43	33	19	22	9	13	11	9	--
Black walnut	4,422	616	931	760	737	589	381	218	108	29	53	--	--
Black cherry	491	125	123	56	61	54	35	8	23	--	6	--	--
Elm	5,408	1,418	1,161	857	625	407	277	225	130	76	149	46	37
Other hardwoods	6,717	1,243	1,175	1,144	932	729	524	326	243	113	191	97	--
Noncommercial species	242	174	43	14	8	--	--	3	--	--	--	--	--
Total hardwoods	239,273	34,737	39,971	43,259	38,447	30,714	19,888	11,637	6,882	4,418	6,429	2,290	601
All species	248,068	36,318	42,138	45,428	40,055	31,346	20,175	11,809	6,948	4,447	6,465	2,313	626

Table 57.--*Net annual growth of growing stock on commercial forest land by species and Forest Survey Unit, Missouri, 1971*

(In cords)

SPECIES	ALL UNITS	EASTERN OZARKS	SOUTHWESTERN OZARKS	NORTHWESTERN OZARKS	PRAIRIE	RIVERBORDER
SOFTWOODS:						
SHORTLEAF PINE	135,665	104,312	28,558	1,791	--	1,004
CYPRESS	2,598	--	--	--	--	2,598
EASTERN REDCEDAR	27,375	3,830	4,138	2,938	1,390	15,079
TOTAL SOFTWOODS	165,638	108,142	32,696	4,729	1,390	18,681
HARDWOODS:						
SELECT WHITE OAKS	444,321	171,794	49,355	51,839	59,501	111,832
OTHER WHITE OAKS	148,997	38,190	35,164	32,867	19,058	23,718
SELECT RED OAKS	122,210	28,936	22,126	11,328	23,973	35,847
RED OAKS	744,892	446,328	132,771	72,770	37,983	55,040
OTHER RED OAKS	75,140	12,008	6,962	3,692	46,325	6,153
HICKORY A	93,030	25,708	8,165	5,649	26,050	27,458
HICKORY B	76,800	29,190	13,635	8,699	12,186	13,090
HARD MAPLE	9,307	2,159	1,074	44	1,094	4,936
SOFT MAPLE	42,036	1,183	89	1,332	33,165	6,267
BEECH	117	--	--	--	--	117
SWEETGUM	4,078	919	--	--	--	3,159
TUPELO AND BLACKGUM	7,877	3,330	1,039	324	--	3,184
ASH	54,390	3,768	3,176	1,990	25,599	19,857
SYCAMORE	73,000	16,789	5,088	11,344	15,736	24,043
COTTONWOOD	35,592	418	--	--	15,031	20,143
RIVER BIRCH	17,420	2,804	--	12	13,154	1,450
YELLOW-POPLAR	815	--	--	--	--	815
BASSWOOD	2,054	--	152	--	1,633	269
BLACK WALNUT	32,620	3,329	4,440	2,635	16,085	6,131
BLACK CHERRY	2,224	394	213	113	1,346	158
ELM	12,992	3,069	1,013	-234	2,976	6,168
OTHER HARDWOODS	78,748	4,493	3,924	2,965	23,267	44,099
TOTAL HARDWOODS	2,078,660	794,809	288,386	207,369	374,162	413,934
ALL SPECIES	2,244,298	902,951	321,082	212,098	375,552	432,615

Table 58.--*Net annual growth of sawtimber on commercial forest land by species and Forest Survey Unit, Missouri, 1971*

(In thousand board feet[1])

SPECIES	ALL UNITS	EASTERN OZARKS	SOUTHWESTERN OZARKS	NORTHWESTERN OZARKS	PRAIRIE	RIVERBORDER
SOFTWOODS:						
SHORTLEAF PINE	29,445	21,192	7,219	892	--	142
CYPRESS	996	--	--	--	--	996
EASTERN REDCEDAR	3,395	241	368	156	361	2,269
TOTAL SOFTWOODS	33,836	21,433	7,587	1,048	361	3,407
HARDWOODS:						
SELECT WHITE OAKS	70,163	17,738	8,479	9,186	12,914	21,846
OTHER WHITE OAKS	13,613	3,110	4,379	2,431	1,256	2,437
SELECT RED OAKS	27,332	4,875	5,382	2,034	6,351	8,690
RED OAKS	115,398	62,598	22,334	11,770	7,840	10,856
OTHER RED OAKS	12,590	2,748	1,064	192	7,834	752
HICKORY A	10,387	1,714	954	606	2,682	4,431
HICKORY B	6,065	2,237	1,332	533	434	1,529
HARD MAPLE	1,210	423	176	--	200	411
SOFT MAPLE	8,779	191	47	418	6,627	1,496
BEECH	42	--	--	--	--	42
SWEETGUM	740	90	--	--	--	650
TUPELO AND BLACKGUM	1,645	852	201	77	--	515
ASH	7,456	672	677	442	3,462	2,203
SYCAMORE	21,266	3,111	1,446	3,611	5,841	7,257
COTTONWOOD	12,341	122	--	--	5,644	6,575
RIVER BIRCH	2,693	719	--	6	1,497	471
YELLOW-POPLAR	198	--	--	--	--	198
BASSWOOD	463	--	--	--	336	127
BLACK WALNUT	4,635	404	668	425	2,659	479
BLACK CHERRY	394	113	48	4	77	152
ELM	-1,728	546	-55	-246	-2,517	544
OTHER HARDWOODS	13,967	269	189	580	2,821	10,108
TOTAL HARDWOODS	329,649	102,532	47,321	32,069	65,958	81,769
ALL SPECIES	363,485	123,965	54,908	33,117	66,319	85,176

1/ INTERNATIONAL 1/4-INCH RULE.

Table 59.--*Timber removals from growing stock and sawtimber on commercial forest land by item and species group, Missouri, 1971*[1]

Item	Growing stock					Sawtimber				
	All species	Shortleaf pine	Other softwoods	Soft hardwoods	Hard hardwoods	All species	Shortleaf pine	Other softwoods	Soft hardwoods	Hard hardwoods
	Cords					Thousand board feet[2]				
Roundwood products:										
Saw logs	609,005	29,608	6,847	135,940	436,610	247,615	14,022	2,573	68,340	162,680
Cooperage logs	97,467	--	--	1,468	95,999	46,581	--	--	563	46,018
Veneer logs	8,506	--	--	2,013	6,493	3,136	--	--	708	2,428
Charcoal wood	67,077	--	--	620	66,457	7,799	--	--	85	7,714
Pulpwood	20,752	865	--	12,202	7,685	6,998	94	--	4,224	2,680
Posts	22,001	9,242	405	582	11,772	3,374	448	21	163	2,742
Poles	3,374	3,349	--	--	25	462	462	--	--	--
Fuelwood	98,492	--	454	9,507	88,531	18,587	--	78	1,753	16,756
Mine timbers	1,216	--	--	--	1,216	114	--	--	--	114
Handle bolts	4,594	--	--	316	4,278	1,778	--	--	135	1,643
Miscellaneous[3]	11,312	--	1,906	5,722	3,684	4,871	--	822	2,465	1,584
All products	943,796	43,064	9,612	168,370	722,750	341,315	15,026	3,494	78,436	244,359
Logging residues	189,783	3,269	219	19,038	167,257	23,636	374	61	2,818	20,383
Other removals	989,201	40,430	8,456	224,460	715,855	177,065	2,324	1,784	44,565	128,392
Total removals	2,122,780	86,763	18,287	411,868	1,605,862	542,016	17,724	5,339	125,819	393,134

1/ See glossary for timber removals from growing stock.
2/ International 1/4-inch rule.
3/ Includes shaving wood, heading bolts, etc.

Table 60.--*Timber removals from growing stock on commercial forest land by species and Forest Survey Unit, Missouri, 1971*

(In cords)

SPECIES	ALL UNITS	EASTERN OZARKS	SOUTHWESTERN OZARKS	NORTHWESTERN OZARKS	PRAIRIE	RIVER8ORDER
SOFTWOODS:						
SHORTLEAF PINE	86,763	26,076	59,539	34	--	1,114
CYPRESS	8,998	111	--	--	--	8,887
EASTERN REDCEDAR	9,154	393	4,883	3,017	25	836
OTHER SOFTWOODS	135	--	135	--	--	--
TOTAL SOFTWOODS	105,050	26,580	64,557	3,051	25	10,837
HARDWOODS:						
SELECT WHITE OAKS	450,433	100,021	52,602	31,208	144,136	122,466
OTHER WHITE OAKS	193,486	53,865	54,436	41,890	36,341	6,954
SELECT RED OAKS	113,028	18,272	8,524	2,238	39,859	44,135
RED OAKS	528,004	221,881	169,727	42,775	38,409	55,212
OTHER RED OAKS	74,282	20,883	4,140	--	30,696	18,563
HICKORY A	74,215	17,904	430	--	40,079	15,802
HICKORY 8	66,222	21,017	22,505	8,911	8,266	5,523
HARD MAPLE	11,827	2,874	140	431	5,230	3,152
SOFT MAPLE	57,672	2,393	253	1,873	45,167	7,986
8EECH	835	76	--	--	--	759
SWEETGUM	12,343	5,153	--	--	--	7,190
TUPELO AND 8LACKGUM	6,003	4,559	659	25	--	760
ASH	45,291	1,899	1,533	1,546	18,614	21,699
SYCAMORE	60,503	9,101	9,189	6,938	20,691	14,584
COTTONWOOD	82,017	1,014	140	684	35,926	44,253
RIVER 8IRCH	6,841	291	38	25	6,181	306
YELLOW-POPLAR	1,886	152	--	--	--	1,734
8ASSWOOD	531	13	115	--	365	38
8LACK WALNUT	23,687	772	3,000	4,013	13,282	2,620
8LACK CHERRY	280	140	51	76	--	13
ELM	134,815	5,583	13,301	10,167	89,484	16,280
OTHER HARDWOODS	73,529	3,278	989	4,162	15,884	49,216
TOTAL HARDWOODS	2,017,730	491,141	341,772	156,962	588,610	439,245
ALL SPECIES	2,122,780	517,721	406,329	160,013	588,635	450,082

Table 61.--*Timber removals from sawtimber on commercial forest land by species and Forest Survey Unit, Missouri, 1971*

(In thousand board feet[1])

SPECIES	ALL UNITS	EASTERN OZARKS	SOUTHWESTERN OZARKS	NORTHWESTERN OZARKS	PRAIRIE	RIVERBORDER
SOFTWOODS:						
SHORTLEAF PINE	17,724	8,995	8,260	15	--	454
CYPRESS	2,009	44	--	--	--	1,965
EASTERN REDCEDAR	3,324	123	1,734	1,209	11	247
OTHER SOFTWOODS	6	--	6	--	--	--
TOTAL SOFTWOODS	23,063	9,162	10,000	1,224	11	2,666
HARDWOODS:						
SELECT WHITE OAKS	118,832	29,390	12,489	7,590	36,306	33,057
OTHER WHITE OAKS	43,639	15,827	11,427	6,855	7,864	1,666
SELECT RED OAKS	24,625	5,186	1,966	558	9,333	7,582
RED OAKS	124,959	62,976	35,425	8,363	8,756	9,439
OTHER RED OAKS	16,889	5,927	832	--	6,778	3,352
HICKORY A	18,870	6,059	58	--	9,403	3,350
HICKORY B	16,467	7,112	4,680	1,710	1,801	1,164
HARD MAPLE	3,303	1,101	57	165	1,282	698
SOFT MAPLE	20,818	1,062	120	846	15,238	3,552
BEECH	308	30	--	--	--	278
SWEETGUM	4,392	2,098	--	--	--	2,294
TUPELO AND BLACKGUM	2,625	1,965	305	4	--	351
ASH	10,836	651	489	571	4,466	4,659
SYCAMORE	23,039	4,064	3,486	3,133	6,475	5,881
COTTONWOOD	33,054	432	69	324	12,039	20,190
RIVER BIRCH	1,772	114	11	18	1,484	145
YELLOW-POPLAR	873	70	--	--	--	803
BASSWOOD	280	8	63	--	190	19
BLACK WALNUT	7,678	276	980	775	4,712	935
BLACK CHERRY	137	64	16	46	3	8
ELM	30,605	2,057	2,330	1,321	20,897	4,000
OTHER HARDWOODS	14,952	769	197	721	3,962	9,303
TOTAL HARDWOODS	518,953	147,238	75,000	33,000	150,989	112,726
ALL SPECIES	542,016	156,400	85,000	34,224	151,000	115,392

1/ INTERNATIONAL 1/4-INCH RULE.

Table 62.--*Net annual growth and removals of growing stock on commercial forest land by species, Missouri, 1971*

(In thousand cubic feet)

Species	Net annual growth	Annual timber removals
Softwoods:		
Shortleaf pine	10,718	6,854
Cypress	205	711
Eastern redcedar	2,162	723
Other softwoods	--	11
Total softwoods	13,085	8,299
Hardwoods:		
Select white oaks	35,101	35,586
Other white oaks	11,772	15,285
Select red oaks	9,655	8,929
Red oaks	58,847	41,713
Other red oaks	5,936	5,868
Hickory A	7,349	5,862
Hickory B	6,066	5,232
Hard maple	735	934
Soft maple	3,320	4,556
Beech	9	66
Sweetgum	322	975
Tupelo and blackgum	623	474
Ash	4,297	3,578
Sycamore	5,766	4,780
Cottonwood	2,813	6,479
River birch	1,377	540
Yellow poplar	64	149
Basswood	162	42
Black walnut	2,576	1,871
Black cherry	176	22
Elm	1,026	10,650
Other hardwoods	6,221	5,809
Total hardwoods	164,213	159,400
All species	177,298	167,699

Table 63.--*Net annual growth and removals of sawtimber on commercial forest land by species, Missouri, 1971*

(In thousand board feet[1])

Species	Net annual growth	Annual timber removals
Softwoods:		
Shortleaf pine	29,445	17,724
Other yellow pine	--	--
Cypress	996	2,009
Eastern redcedar	3,395	3,324
Other softwoods	--	6
Total softwoods	33,836	23,063
Hardwoods:		
Select white oak	70,163	118,832
Other white oak	13,613	43,639
Select red oaks	27,332	24,625
Red oaks	115,398	124,959
Other red oaks	12,590	16,889
Hickory A	10,387	18,870
Hickory B	6,065	16,467
Hard maple	1,210	3,303
Soft maple	8,779	20,818
Beech	42	308
Sweetgum	740	4,392
Tupelo and blackgum	1,645	2,625
Ash	7,456	10,836
Sycamore	21,266	23,039
Cottonwood	12,341	33,054
River birch	2,693	1,772
Yellow poplar	198	873
Basswood	463	280
Black walnut	4,635	7,678
Black cherry	394	137
Elm	-1,728	30,605
Other hardwoods	13,967	14,952
Noncommercial species	--	--
Total hardwoods	329,649	518,953
All species	363,485	542,016

[1]International ¼-inch rule.

Table 64.--*Net annual growth and removals of growing stock on commercial forest land by ownership class and softwoods and hardwoods, Missouri, 1971*

(In thousand cubic feet)

Ownership class	Net annual growth			Annual removals		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
National Forest	25,308	5,909	19,399	7,191	1,340	5,851
Other public	5,382	507	4,875	469	39	430
Forest industry	7,000	625	6,375	2,564	114	2,450
Farmer and miscellaneous private	139,608	6,044	133,564	157,475	6,806	150,669
All ownerships	177,298	13,085	164,213	167,699	8,299	159,400

Table 65.--*Net annual growth and removals of sawtimber on commercial forest land by ownership class and softwoods and hardwoods, Missouri, 1971*

(In thousand board feet[1])

Ownership class	Net annual growth			Annual removals		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
National Forest	55,098	18,246	36,852	29,971	5,935	24,036
Other public	11,804	907	10,897	1,867	138	1,729
Forest industry	12,715	975	11,740	10,395	595	9,800
Farmer and miscellaneous private	283,868	13,708	270,160	499,783	16,395	483,388
All ownerships	363,485	33,836	329,649	542,016	23,063	518,953

[1]International ¼-inch rule.

Table 66.--*Annual mortality of growing stock and sawtimber on commercial forest land by species, Missouri, 1971*

Species	Growing stock	Sawtimber
	Thousand cubic feet	Thousand board feet[1/]
Softwoods:		
Shortleaf pine	337	935
Eastern redcedar	59	--
Total softwoods	396	935
Hardwoods:		
Select white oaks	1,846	2,407
Other white oaks	837	919
Select red oaks	563	2,010
Red oaks	3,181	7,381
Other red oaks	804	3,020
Hickory A	337	638
Hickory B	254	328
Hard maple	58	--
Soft maple	182	159
Ash	278	980
Sycamore	173	--
Cottonwood	523	2,856
Black walnut	348	879
Black cherry	52	--
Elm	2,624	7,060
Other hardwoods	499	923
Total hardwoods	12,559	29,560
All species	12,955	30,495

1/ International 1/4-inch rule.

Table 67.--*Annual mortality of growing stock and sawtimber on commercial forest land by ownership class and softwoods and hardwoods, Missouri, 1971*

Ownership class	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	Thousand cubic feet			*Thousand board feet*[1]		
National Forest	1,663	179	1,484	3,808	504	3,304
Other public	352	12	340	890	30	860
Forest industry	346	21	325	815	25	790
Farmer and miscellaneous private	10,594	184	10,410	24,982	376	24,606
All ownerships	12,955	396	12,559	30,495	935	29,560

[1]International ¼-inch rule.

Table 68.--*Annual mortality of growing stock and sawtimber on commercial forest land by cause and softwoods and hardwoods, Missouri, 1971*

Cause	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	Thousand cubic feet			Thousand board feet[1/]		
Disease	6,118	--	6,118	15,530	--	15,530
Fire	467	--	467	232	--	232
Weather	1,948	167	1,781	7,713	935	6,778
Suppression	346	38	308	--	--	--
Unknown and other	3,502	140	3,362	5,195	--	5,195
Logging	574	51	523	1,825	--	1,825
All causes	12,955	396	12,559	30,495	935	29,560

1/ International 1/4-inch rule.

Table 69.--*Output of timber products by source of material and softwoods and hardwoods, Missouri, 1969*

Product and species group	Standard unit[1]	Total		Roundwood products				Plant byproducts	
				Growing stock		Nongrowing stock			
		No. of units	M. cu. ft.	No. of units	M. cu. ft.	No. of units	M. cu. ft.	No. of units	M. cu. ft.
Saw logs	M. bd. ft.								
Softwoods		18,478	3,308	18,467	3,306	11	2	--	--
Hardwoods		360,952	63,013	259,093	45,231	101,859	17,782	--	--
Total		379,430	66,321	277,560	48,537	101,870	17,784	--	--
Veneer logs	M. bd. ft.								
Softwoods		--	--	--	--	--	--	--	--
Hardwoods		4,626	1,014	3,066	672	1,560	342	--	--
Total		4,626	1,014	3,066	672	1,560	342	--	--
Cooperage logs	M. bd. ft.								
Softwoods		--	--	--	--	--	--	--	--
Hardwoods		53,675	8,845	48,602	8,009	5,073	836	--	--
Total		53,675	8,845	48,602	8,009	5,073	836	--	--
Pulpwood	Std. cords								
Softwoods		--	--	--	--	--	--	--	--
Hardwoods		80,609	6,326	16,329	1,262	8,152	630	56,128	4,434
Total		80,609	6,326	16,329	1,262	8,152	630	56,128	4,434
Poles	M. pieces								
Softwoods		89,500	265	89,500	265	--	--	--	--
Hardwoods		700	2	700	2	--	--	--	--
Total		90,200	267	90,200	267	--	--	--	--
Mine timbers	M. cu. ft.								
Softwoods		--	--	--	--	--	--	--	--
Hardwoods		128	128	96	96	32	32	--	--
Total		128	128	96	96	32	32	--	--
Posts	M. pieces								
Softwoods		1,519	1,152	1,036	786	483	366	--	--
Hardwoods		2,548	1,348	1,852	976	696	372	--	--
Total		4,067	2,500	2,888	1,762	1,179	738	--	--
Charcoal wood	Std. cords								
Softwoods		1,414	99	--	--	--	--	1,414	99
Hardwoods		283,864	19,812	75,966	5,299	162,627	11,344	45,271	3,169
Total		285,278	19,911	75,966	5,299	162,627	11,344	46,685	3,268
Other[2]	M. cu. ft.								
Softwoods		475	475	338	338	--	--	137	137
Hardwoods		3,190	3,190	1,106	1,106	39	39	2,045	2,045
Total		3,665	3,665	1,444	1,444	39	39	2,182	2,182
Fuelwood	Std. cords								
Softwoods		2,031	130	580	37	1,020	65	431	28
Hardwoods		419,246	27,071	120,035	7,745	257,365	16,606	41,846	2,720
Total		421,277	27,201	120,615	7,782	258,385	16,671	42,277	2,748
All products	M. cu. ft.								
Softwoods		5,429	5,429	4,732	4,732	433	433	264	264
Hardwoods		130,749	130,749	70,398	70,398	47,983	47,983	12,368	12,368
Total		136,178	136,178	75,130	75,130	48,416	48,416	12,632	12,632

[1]M (meaning thousand) board feet by International ¼-inch rule. Cords are on a rough wood, 128 cubic feet basis.
[2]Other (industrial production) includes handle bolts, shaving bolts, heading stock, etc.

Table 70.--*Timber products output from roundwood by species and product, Missouri, 1969*

Species	Saw logs		Veneer logs		Cooperage logs		Charcoal wood		Other products 3/	All products
	M bd. ft. 1/	M cu. ft.	M bd. ft. 1/	M cu. ft.	M bd. ft. 1/	M cu. ft.	Cords 2/	M cu. ft.	M cu. ft.	M cu. ft.
Softwoods:										
Shortleaf pine	15,235	2,645	0	0	0	0	0	0	1,378	4,023
Cypress	187	33	0	0	0	0	0	0	2	35
Eastern redcedar	2,567	545	0	0	0	0	0	0	464	1,009
Other softwoods	489	85	0	0	0	0	0	0	13	98
Total softwoods	18,478	3,308	0	0	0	0	0	0	1,857	5,165
Hardwoods:										
White oaks	66,265	11,820	45	10	52,389	8,623	78,137	5,466	17,743	43,662
Red oaks	68,345	12,178	24	5	0	0	18,358	1,272	1,628	15,083
Black oak	116,507	20,785	0	0	0	0	109,771	7,673	3,126	31,584
Hickory	15,060	2,562	1,013	226	0	0	28,476	1,987	1,577	6,352
Hard maple	1,670	273	0	0	0	0	91	3	0	276
Soft maple	15,888	2,515	26	6	57	10	20	0	573	3,104
Beech	273	46	0	0	0	0	0	0	3	49
Sweetgum	3,306	525	34	7	672	115	0	0	4	651
Blackgum	2,750	431	0	0	0	0	302	18	1	450
Ash	3,549	589	0	0	57	10	1,133	74	287	960
Cottonwood	24,557	3,783	488	111	57	10	0	0	1,230	5,134
Basswood	309	41	8	2	0	0	0	0	0	43
Yellow-poplar	958	150	20	4	0	0	0	0	0	154
Black walnut	12,593	2,760	2,836	614	0	0	49	1	0	3,375
Black cherry	146	20	0	0	0	0	195	12	0	32
Elm	6,123	964	3	0	229	40	1,400	95	1,329	2,428
Birch	484	67	0	0	57	10	0	0	22	99
Sycamore	20,190	3,196	129	29	157	27	661	42	212	3,506
Other hardwoods	1,979	308	0	0	0	0	0	0	1,131	1,439
Total hardwoods	360,952	63,013	4,626	1,014	53,675	8,845	238,593	16,643	23,866	118,381
All species	379,430	66,321	4,626	1,014	53,675	8,845	238,593	16,643	30,723	123,546

1/ International 1/4-inch rule.
2/ Standard cords, rough wood basis.
3/ Includes posts, fuelwood, shaving bolts, heading bolts, etc.

Table 71.--*Forest products harvested by ownership class and product, Missouri, 1969*

Ownership class	Saw logs	Cooperage logs	Veneer logs	Pulp-wood	Charcoal wood	Posts	Fuel-wood	Poles	Mine timbers	Handle bolts	Miscellaneous
	M bd.ft.[1]	M bd.ft.[1]	M bd.ft.[1]	Cords[2]	Cords[2]	M pieces	Cords[2]	Pieces	M cu. ft.	M bd.ft.[1]	M cu. ft.
Federal:											
National Forest:											
Softwoods	5,612	--	--	--	--	480	--	650	--	--	--
Hardwoods	33,813	107	35	--	2,738	1	6,751	--	--	--	--
U.S.Army:											
Hardwoods	475	--	--	--	--	--	--	--	--	--	--
Corps of Engineers:											
Softwoods	--	--	--	--	--	4	--	--	--	--	--
Hardwoods	138	4	--	--	--	--	--	--	--	--	--
Total	40,038	111	35	--	2,738	491	6,751	650	--	--	--
State:											
Softwoods	126	--	--	--	--	25	--	--	--	--	--
Hardwoods	1,681	112	--	--	591	--	8	--	--	100	--
Total	1,807	112	--	--	591	25	8	--	--	100	--
Private:											
Industrial:											
Softwoods	585	--	--	--	--	--	--	--	--	--	--
Hardwoods	12,024	1,011	14	--	15,691	--	--	--	--	--	--
Farm and other:											
Softwoods	12,155	--	--	--	--	1,004	1,600	88,850	--	--	338
Hardwoods	312,821	52,441	4,577	24,481	219,573	2,547	370,641	700	128	2,443	743
Total	337,585	53,452	4,591	24,481	235,264	3,551	372,241	89,550	128	2,443	1,081
All owners:											
Softwoods	18,478	--	--	--	--	1,519	1,600	89,500	--	--	338
Hardwoods	360,952	53,675	4,626	24,481	238,593	2,548	377,400	700	128	2,543	743
Total	379,430	53,675	4,626	24,481	238,593	4,067	379,000	90,200	128	2,543	1,081

1/ International 1/4-inch rule.
2/ Standard cords, rough wood basis.

Table 72.--*Volume of primary plant residue by kind of material and type of use, Missouri, 1969*

(In thousand cubic feet)

Source industry and kind of residue	Volume by type of use								
	Fiber[1]		Charcoal		Fuel[2]		Other[3]		Not used[4]
	Hard-woods	Soft-woods	Hard-woods	Soft-woods	Hard-woods	Soft-woods	Hard-woods	Soft-woods	Hard-woods
Lumber:									
Coarse	3,252	99	2,944	25	1,355	59	18	548	6,922
Fine	250	--	--	3	406	78	1,264	426	8,112
Total	3,502	99	2,944	28	1,761	137	1,282	974	15,034
All other:									
Coarse	726	--	183	--	758	--	57	--	463
Fine	206	--	42	--	201	--	706	--	2,348
Total	932	--	225	--	959	--	763	--	2,811
All industries:									
Coarse	3,978	99	3,127	25	2,113	59	75	548	7,385
Fine	456	--	42	3	607	78	1,970	426	10,460
Total	4,434	99	3,169	28	2,720	137	2,045	974	17,845

1/ For manufacture of pulp, hardboard, or roofing felt.
2/ All residue used for industrial or domestic fuel whether sold or given away.
3/ Includes uses such as livestock bedding, mulch, small dimension, and specialty items.
4/ Includes residue burned as waste.

Table 73.--*Removals,*[1] *net annual growth, and inventory of growing stock on commercial forest land, Missouri, 1972 and low removals option projections*[2] *to 2002*

(In million cubic feet)

Year	Removals			Growth			Inventory		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
1972	167.7	8.3	159.4	177.3	13.1	164.2	6,001.5	368.8	5,632.7
1982	168.8	8.8	160.0	178.5	14.4	164.1	6,096.7	422.7	5,674.0
1992	170.7	10.7	160.0	179.2	15.4	163.8	6,187.4	474.6	5,712.8
2002	173.1	13.1	160.0	179.3	16.0	163.3	6,260.9	512.8	5,748.1

[1]Timber removals includes volume "lost" due to land clearing, flooding, thinning, or changes in land use, in addition to timber cut and used.

[2]Based on the following assumptions: (a) that the overall removals rate will be lower than that for the high removals option; (b) that annual removals rates will differ for each timber product, but that the average annual removals rate for softwoods will be 1.93 percent and for hardwoods, 0.01 percent; (c) that the total area of commercial forest land will decline at an annual rate of 0.217 percent; (d) that radial growth will decline over time in relation to the increase of basal area per acre of trees; (e) that the intensity of forest management practiced will continue at the rate indicated by recent trends; (f) that use of both softwoods and hardwoods for pulpwood will increase, but use of softwoods will increase at a faster rate; and (g) that the volume of "other" removals will drop during the period as more of these trees are utilized.

Table 74.--*Removals,*[1] *net annual growth, and inventory of growing stock on commercial forest land, Missouri, 1972, and high removals option projections*[2] *to 2002*

(In million cubic feet)

Year	Removals			Growth			Inventory		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
1972	167.7	8.3	159.4	177.3	13.1	164.2	6,001.5	368.8	5,632.7
1982	170.2	9.2	161.0	178.4	14.4	164.0	6,093.5	421.5	5,672.0
1992	181.7	12.9	168.8	178.1	15.1	163.0	6,116.2	457.3	5,658.9
2002	196.6	16.6	180.0	175.6	15.3	160.3	5,988.8	461.0	5,527.8

[1]Timber removals includes volume "lost" due to land clearing, flooding, thinning, or changes in land use, in addition to timber cut and used.

[2]Based on the following assumptions: (a) that the overall removals rate will be higher than that for the low removals option; (b) that annual removals rates will differ for each timber product, but that the average annual removals rate for softwoods will be 3.33 percent and for hardwoods, 0.43 percent; (c) that the total area of commercial forest land will decline at an annual rate of 0.217 percent; (d) that radial growth will decline over time in relation to the increase of basal area per acre of trees; (e) that the intensity of forest management practiced will continue at the rate indicated by recent trends; (f) that use of both softwoods and hardwoods for pulpwood will increase but use of softwoods will increase at a faster rate; and (g) that the volume of "other" removals will drop during the period as more of these trees are utilized.

Table 75.--*Average annual managed harvest for 1972-1981, from harvest cuttings and thinnings on commercial forest land by species and kind of material, Missouri*

Species	Growing stock[1]			Sawtimber[1]	Rough and rotten trees		
	Total	Poletimber trees	Sawtimber trees	Total	Total	Short log trees	Other
	Cords			Thousand bd.ft.[2]	Cords		
Softwoods:							
Shortleaf pine	95,506	27,178	68,328	29,053	3,037	51	2,986
Cypress	7,013	25	6,988	2,563	2,228	494	1,734
Eastern redcedar	11,456	7,278	4,178	1,729	6,051	1,038	5,013
Total softwoods	113,975	34,481	79,494	33,345	11,316	1,583	9,733
Hardwoods:							
Select white oaks	538,555	170,239	368,316	108,722	226,911	61,607	165,304
Other white oaks	217,658	96,455	121,203	40,500	126,329	23,760	102,569
Select red oaks	118,355	20,823	97,532	31,843	41,290	8,279	33,011
Red oaks	478,772	142,418	336,354	124,128	204,608	37,331	167,277
Other red oaks	35,480	13,633	21,847	7,639	53,645	7,468	46,177
Hickory A	88,722	33,658	55,064	15,533	33,228	4,683	28,545
Hickory B	82,618	47,365	35,253	13,023	33,912	5,013	28,899
Hard maple	11,861	5,912	5,949	1,714	18,026	1,824	16,202
Soft maple	25,837	7,341	18,496	4,809	34,480	5,544	28,936
Beech	25	--	25	11	722	--	722
Sweetgum	4,064	519	3,545	1,538	1,860	215	1,645
Tupelo and blackgum	13,760	5,861	7,899	3,113	9,455	2,632	6,823
Ash	37,732	13,948	23,784	7,757	30,279	4,367	25,912
Sycamore	41,265	6,164	35,101	9,745	11,569	3,075	8,494
Cottonwood	32,114	2,697	29,417	10,383	7,482	1,177	6,305
River birch	10,975	3,634	7,341	1,962	7,050	1,899	5,151
Yellow-poplar	1,279	114	1,165	266	126	--	126
Basswood	2,810	873	1,937	378	4,557	291	4,266
Black walnut	25,279	8,405	16,874	3,293	19,987	4,772	15,215
Black cherry	1,911	557	1,354	568	4,520	266	4,254
Elm	32,355	13,709	18,646	3,790	49,064	6,355	42,709
Other hardwoods	63,039	22,167	40,872	12,875	47,544	5,152	42,392
Noncommercial species	--	--	--	--	1,165	--	1,165
Total hardwoods	1,864,466	616,492	1,247,974	403,590	967,809	185,710	782,099
All species	1,978,441	650,973	1,327,468	436,935	979,125	187,293	791,832

1/ Cuttings of less than 3 cords per acre, or the equivalent in board feet, are excluded.
2/ International 1/4-inch rule.

Table 76.--*Average annual managed harvest of growing stock for 1972-1981, from harvest cuttings and thinnings, on commercial forest land by species and forest type, Missouri*[1]

(In thousand cubic feet)

Species	All forest types	Short-leaf pine	Eastern redcedar	Eastern redcedar-hardwood	Shortleaf pine-oak	Post-blackjack oak	Black-scarlet oak	White oak	Oak-gum-cypress	Elm-ash-cottonwood	Cottonwood	Maple-beech
Softwoods:												
Shortleaf pine	7,545	2,544	--	26	2,447	436	1,442	547	--	92	--	11
Cypress	554	--	--	--	--	--	--	--	443	111	--	--
Eastern redcedar	905	33	372	217	28	24	--	165	--	38	--	28
Total softwoods	9,004	2,577	372	243	2,475	460	1,442	712	443	241	--	39
Hardwoods:												
Select white oaks	42,546	230	142	434	528	1,767	12,101	25,334	764	812	--	434
Other white oaks	17,195	56	--	108	266	12,093	3,311	1,312	--	19	--	30
Select red oaks	9,350	--	40	81	101	542	5,923	2,098	66	191	--	308
Red oaks	37,823	410	63	123	1,169	3,119	28,054	4,326	--	420	--	139
Other red oaks	2,803	15	--	--	23	825	442	50	1,183	261	--	4
Hickory A	7,009	--	--	3	67	504	3,013	1,706	511	1,153	--	52
Hickory B	6,527	45	--	22	98	1,938	2,456	1,350	263	65	--	290
Hard maple	937	--	4	--	--	--	278	340	--	--	--	315
Soft maple	2,041	--	--	--	15	--	--	43	109	1,874	--	--
Beech	2	--	--	--	--	--	--	--	--	--	--	2
Sweetgum	321	--	--	--	--	--	71	--	33	199	--	18
Tupelo and blackgum	1,087	39	--	--	--	16	390	399	161	19	--	63
Ash	2,981	--	4	105	--	100	398	514	105	1,710	3	42
Sycamore	3,260	--	--	7	--	26	511	55	169	2,082	--	410
Cottonwood	2,537	--	--	--	--	--	--	66	--	2,277	194	--
River birch	867	--	--	--	--	--	--	--	274	563	--	30
Yellow-poplar	101	--	--	--	--	--	65	26	--	--	--	10
Basswood	222	--	--	--	--	--	56	23	--	99	--	44
Black walnut	1,997	--	14	45	7	36	655	581	83	442	--	134
Black cherry	151	--	--	--	--	7	70	50	--	24	--	--
Elm	2,556	20	--	87	15	186	452	340	52	903	--	501
Other hardwoods	4,980	--	--	77	--	152	202	279	303	3,838	--	129
Total hardwoods	147,293	815	267	1,092	2,289	21,311	58,448	38,892	4,076	16,951	197	2,955
All species	156,297	3,392	639	1,335	4,764	21,771	59,890	39,604	4,519	17,192	197	2,994

1/ Cuttings of less than 240 cubic feet per acre are excluded.

Table 77.--*Average annual managed harvest of growing stock for 1972-1981, from harvest cuttings and thinnings on commercial forest land by species and stand-volume class, Missouri*[1]

(In thousand cubic feet)

Species	All classes	Stand-volume class (cubic feet per acre)				
		240-399	400-799	800-1,199	1,200-1,599	1,600+
Softwoods:						
Shortleaf pine	7,545	1,485	2,940	2,254	297	569
Cypress	554	32	45	7	143	327
Eastern redcedar	905	181	177	521	26	--
Total softwoods	9,004	1,698	3,162	2,782	466	896
Hardwood:						
Select white oaks	42,546	2,607	11,680	15,288	8,596	4,375
Other white oaks	17,195	1,564	7,697	4,547	2,286	1,101
Select red oaks	9,350	597	2,466	3,681	2,039	567
Red oaks	37,823	3,077	12,752	13,984	5,875	2,135
Other red oaks	2,803	244	893	886	650	130
Hickory A	7,009	386	2,574	2,730	539	780
Hickory B	6,527	621	2,388	2,316	1,051	151
Hard maple	937	96	202	248	246	145
Soft maple	2,041	9	212	479	774	567
Beech	2	--	2	--	--	--
Sweetgum	321	1	25	141	107	47
Tupelo and blackgum	1,087	58	243	376	319	91
Ash	2,981	151	1,082	809	637	302
Sycamore	3,260	99	977	1,219	381	584
Cottonwood	2,537	--	652	659	27	1,199
River birch	867	--	190	351	326	--
Yellow-poplar	101	--	10	26	--	65
Basswood	222	--	26	155	--	41
Black walnut	1,997	130	579	643	603	42
Black cherry	151	7	40	34	70	--
Elm	2,556	135	323	935	865	298
Other hardwoods	4,980	103	613	2,035	899	1,330
Total hardwoods	147,293	9,885	45,626	51,542	26,290	13,950
All species	156,297	11,583	48,788	54,324	26,756	14,846

1/ Cuttings of less than 240 cubic feet per acre are excluded.

Table 78.--*Average annual managed harvest for 1972-1981 by harvest cuttings of growing stock on commercial forest land and by species and stand-volume class, Missouri*

(In thousand cubic feet)

Species	All classes	Stand-volume class[1/] (cubic feet per acre)				
		240-399	400-799	800-1,199	1,200-1,599	1,600+
Softwoods:						
Shortleaf pine	5,781	790	2,325	1,814	283	569
Cypress	393	29	--	--	37	327
Eastern redcedar	875	176	152	521	26	--
Total softwoods	7,049	995	2,477	2,335	346	896
Hardwoods:						
Select white oaks	39,007	1,886	9,818	14,482	8,446	4,375
Other white oaks	16,574	1,413	7,366	4,461	2,233	1,101
Select red oaks	8,853	435	2,231	3,606	2,014	567
Red oaks	30,622	1,454	9,047	12,712	5,274	2,135
Other red oaks	1,989	201	778	350	530	130
Hickory A	6,276	258	2,086	2,613	539	780
Hickory B	5,976	477	2,073	2,224	1,051	151
Hard maple	858	33	186	248	246	145
Soft maple	1,041	9	125	196	432	279
Sweetgum	300	--	5	141	107	47
Tupelo and blackgum	864	34	200	371	168	91
Ash	2,517	106	833	768	571	239
Sycamore	2,479	78	652	1,001	381	367
Cottonwood	946	--	365	469	--	112
River birch	490	--	45	169	276	--
Yellow-poplar	65	--	--	--	--	65
Basswood	120	--	23	56	--	41
Black walnut	1,767	54	480	588	603	42
Black cherry	127	7	16	34	70	--
Elm	2,133	96	189	754	845	249
Other hardwoods	2,181	100	449	801	310	521
Total hardwoods	125,185	6,641	36,967	46,044	24,096	11,437
All species	132,234	7,636	39,444	48,379	24,442	12,333

1/ Cuttings of less than 240 cubic feet per acre are excluded.

Table 79.--*Average annual managed harvest for 1972-1981 by thinnings of growing stock on commercial forest land and by species and stand-volume class, Missouri*

(In thousand cubic feet)

Species	All classes	Stand-volume class 1/ (cubic feet per acre)				
		240-399	400-799	800-1,199	1,200-1,599	1,600+
Softwoods:						
Shortleaf pine	1,764	695	615	440	14	--
Cypress	161	3	45	7	106	--
Eastern redcedar	30	5	25	--	--	--
Total softwoods	1,955	703	685	447	120	--
Hardwoods:						
Select white oaks	3,539	721	1,862	806	150	--
Other white oaks	621	151	331	86	53	--
Select red oaks	497	162	235	75	25	--
Red oaks	7,201	1,623	3,705	1,272	601	--
Other red oaks	814	43	115	536	120	--
Hickory A	733	128	488	117	--	--
Hickory B	551	144	315	92	--	--
Hard maple	79	63	16	--	--	--
Soft maple	1,000	--	87	283	342	288
Beech	2	--	2	--	--	--
Sweetgum	21	1	20	--	--	--
Tupelo and blackgum	223	24	43	5	151	--
Ash	464	45	249	41	66	63
Sycamore	781	21	325	218	--	217
Cottonwood	1,591	--	287	190	27	1,087
River birch	377	--	145	182	50	--
Yellow-poplar	36	--	10	26	--	--
Basswood	102	--	3	99	--	--
Black walnut	230	76	99	55	--	--
Black cherry	24	--	24	--	--	--
Elm	423	39	134	181	20	49
Other hardwoods	2,799	3	164	1,234	589	809
Total hardwoods	22,108	3,244	8,659	5,498	2,194	2,513
All species	24,063	3,947	9,344	5,945	2,314	2,513

1/ Cuttings of less than 240 cubic feet per acre are excluded.

Table 80.--*Average annual managed harvest of sawtimber*[1] *for 1972-1981, from harvest cuttings and thinnings, on commercial forest land by species and forest type, Missouri*

(In thousand board feet[2])

Species	All forest types	Short-leaf pine	Eastern redcedar	Eastern redcedar-hardwood	Shortleaf pine-oak	Post-blackjack oak	Black-scarlet oak	White oak	Oak-gum-cypress	Elm-ash-cottonwood	Cotton-wood	Maple-beech
Softwoods:												
Shortleaf pine	29,970	9,517	--	153	10,270	1,380	5,735	2,431	--	449	--	35
Cypress	2,570	--	--	--	--	--	--	--	2,070	500	--	--
Eastern redcedar	2,060	58	1,089	407	79	--	1	251	--	175	--	--
Total soft-woods	34,600	9,575	1,089	560	10,349	1,380	5,736	2,682	2,070	1,124	--	35
Hardwoods:												
Select white oaks	134,238	378	331	1,093	1,701	6,563	36,603	79,729	3,281	2,738	--	1,821
Other white oaks	45,358	56	--	576	695	30,568	9,925	3,358	--	60	--	120
Select red oaks	37,961	--	113	393	8	2,225	25,070	7,346	695	943	--	1,168
Red oaks	133,408	1,190	110	469	3,186	9,988	99,488	17,242	188	1,134	--	413
Other red oaks	8,910	--	--	--	128	2,574	1,338	273	3,439	1,140	--	18
Hickory A	20,899	--	--	77	265	1,421	8,395	5,092	1,569	4,018	--	62
Hickory B	13,567	--	--	80	264	3,216	5,384	2,803	586	89	--	1,145
Hard maple	1,857	--	--	--	--	--	566	603	--	--	--	688
Soft maple	6,542	--	--	--	--	--	--	--	473	6,069	--	--
Beech	11	--	--	--	--	--	--	--	--	--	--	11
Sweetgum	1,547	--	--	--	--	--	275	--	61	1,177	--	34
Tupelo and blackgum	3,209	60	--	--	3	77	1,150	1,277	491	33	--	118
Ash	9,188	--	10	108	--	311	1,465	1,135	150	5,987	--	22
Sycamore	13,984	--	--	71	--	135	2,363	305	1,052	8,732	--	1,326
Cottonwood	12,127	--	--	--	--	--	--	327	--	10,913	887	--
River birch	2,652	--	--	--	--	--	--	--	679	1,856	--	117
Yellow-poplar	266	--	--	--	--	--	135	106	--	--	--	25
Basswood	615	--	--	--	--	--	137	100	--	216	--	162
Black walnut	5,828	--	86	52	--	65	2,192	1,449	380	1,379	--	225
Black cherry	568	--	--	--	--	35	190	236	--	107	--	--
Elm	6,269	--	--	--	--	19	1,242	995	54	2,691	--	1,268
Other hardwoods	15,443	--	--	299	--	224	439	535	1,138	12,391	--	417
Total hardwoods	474,447	1,684	650	3,218	6,250	57,421	196,357	122,911	14,236	61,673	887	9,160
All species	509,047	11,259	1,739	3,778	16,599	58,801	202,093	125,593	16,306	62,797	887	9,195

1/ Cuttings of less than 3 cords per acre or the equivalent in board feet included.
2/ International 1/4-inch rule.

Table 81.--*Average annual managed harvest of sawtimber*[1] *for 1972-1981, from harvest cuttings and thinnings on commercial forest land by species and stand-volume class, Missouri*

(In thousand board feet[2])

Species	All classes	Stand-volume class (board feet per acre)					
		0-1,499	1,500-2,499	2,500-4,999	5,000-7,499	7,500-9,999	10,000+
Softwoods:							
Shortleaf pine	29,970	9,193	6,539	12,189	2,049	--	--
Cypress	2,570	348	169	550	416	--	1,087
Eastern redcedar	2,060	1,284	776	--	--	--	--
Total softwoods	34,600	10,825	7,484	12,739	2,465	--	1,087
Hardwoods:							
Select white oaks	134,238	28,665	31,647	60,609	12,436	656	225
Other white oaks	45,358	16,398	15,970	8,535	3,772	683	--
Select red oaks	37,961	8,567	8,499	16,762	4,133	--	--
Red oaks	133,408	30,110	36,114	51,403	13,502	2,279	--
Other red oaks	8,910	3,511	1,859	2,791	749	--	--
Hickory A	20,899	4,130	7,216	5,117	3,043	237	1,156
Hickory B	13,567	4,227	3,577	4,437	1,326	--	--
Hard maple	1,857	496	800	561	--	--	--
Soft maple	6,542	961	385	2,541	1,748	--	907
Beech	11	11	--	--	--	--	--
Sweetgum	1,547	18	34	1,335	--	160	--
Tupelo and blackgum	3,209	466	397	1,591	755	--	--
Ash	9,188	2,064	1,567	2,755	2,337	--	465
Sycamore	13,984	3,548	2,520	3,771	2,248	--	1,897
Cottonwood	12,127	1,389	1,935	3,197	1,888	--	3,718
River birch	2,652	578	274	1,800	--	--	--
Yellow-poplar	266	131	--	--	135	--	--
Basswood	615	353	100	162	--	--	--
Black walnut	5,828	1,775	1,505	1,632	916	--	--
Black cherry	568	378	--	--	190	--	--
Elm	6,269	766	785	3,202	1,484	--	32
Other hardwoods	15,443	975	3,209	6,455	422	--	4,382
Total hardwoods	474,447	109,517	118,393	178,656	51,084	4,015	12,782
All species	509,047	120,342	125,877	191,395	53,549	4,015	13,869

1/ Cuttings of less than 3 cords per acre, or the equivalent in board feet, are included.

2/ International 1/4-inch rule.

Table 82.--*Average annual managed harvest for 1972-1981 by harvest cuttings of sawtimber*[1] *on commercial forest land and by species and stand-volume class, Missouri*

(In thousand board feet[2])

Species	All classes	Stand-volume class (board feet per acre)					
		0-1,499	1,500-2,499	2,500-4,999	5,000-7,499	7,500-9,999	10,000+
Softwoods:							
Shortleaf pine	23,767	4,922	6,203	10,593	2,049	--	--
Cypress	1,803	120	--	180	416	--	1,087
Eastern redcedar	1,862	1,196	666	--	--	--	--
Total softwoods	27,432	6,238	6,869	10,773	2,465	--	1,087
Hardwoods:							
Select white oaks	126,008	24,204	29,799	58,688	12,436	656	225
Other white oaks	44,338	15,615	15,809	8,459	3,772	683	--
Select red oaks	36,398	7,358	8,145	16,762	4,133	--	--
Red oaks	116,361	19,820	30,273	50,487	13,502	2,279	--
Other red oaks	7,442	2,588	1,591	2,514	749	--	--
Hickory A	18,937	2,937	6,712	4,852	3,043	237	1,156
Hickory B	12,728	3,607	3,358	4,437	1,326	--	--
Hard maple	1,749	388	800	561	--	--	--
Soft maple	3,479	332	354	645	1,353	--	795
Sweetgum	1,538	9	34	1,335	--	160	--
Tupelo and blackgum	2,519	272	221	1,271	755	--	--
Ash	8,407	1,746	1,185	2,674	2,337	--	465
Sycamore	11,239	2,394	1,974	3,657	2,248	--	966
Cottonwood	4,535	643	1,460	2,092	--	--	340
River birch	2,032	115	117	1,800	--	--	--
Yellow-poplar	135	--	--	--	135	--	--
Basswood	399	137	100	162	--	--	--
Black walnut	5,379	1,363	1,468	1,632	916	--	--
Black cherry	506	316	--	--	190	--	--
Elm	5,801	523	672	3,122	1,484	--	--
Other hardwoods	6,679	761	1,049	3,619	422	--	828
Total hardwoods	416,609	85,128	105,121	168,769	48,801	4,015	4,775
All species	444,041	91,366	111,990	179,542	51,266	4,015	5,862

1/ Cuttings of less than 3 cords per acre, or the equivalent in board feet, are included.

2/ International 1/4-inch rule.

Table 83.--*Average annual managed harvest for 1972-1981 by thinnings of sawtimber*[1] *on commercial forest land and by species and stand-volume class, Missouri*

(In thousand board feet[2])

Species	All classes	Stand-volume class (board feet per acre)					
		0- 1,499	1,500- 2,499	2,500- 4,999	5,000- 7,499	7,500- 9,999	10,000+
Softwoods:							
Shortleaf pine	6,203	4,271	336	1,596	--	--	--
Cypress	767	228	169	370	--	--	--
Eastern redcedar	198	88	110	--	--	--	--
Total softwoods	7,168	4,587	615	1,966	--	--	--
Hardwoods:							
Select white oaks	8,230	4,461	1,848	1,921	--	--	--
Other white oaks	1,020	783	161	76	--	--	--
Select red oaks	1,563	1,209	354	--	--	--	--
Red oaks	17,047	10,290	5,841	916	--	--	--
Other red oaks	1,468	923	268	277	--	--	--
Hickory A	1,962	1,193	504	265	--	--	--
Hickory B	839	620	219	--	--	--	--
Hard maple	108	108	--	--	--	--	--
Soft maple	3,063	629	31	1,896	395	--	112
Beech	11	11	--	--	--	--	--
Sweetgum	9	9	--	--	--	--	--
Tupelo and blackgum	690	194	176	320	--	--	--
Ash	781	318	382	81	--	--	--
Sycamore	2,745	1,154	546	114	--	--	931
Cottonwood	7,592	746	475	1,105	1,888	--	3,378
River birch	620	463	157	--	--	--	--
Yellow poplar	131	131	--	--	--	--	--
Basswood	216	216	--	--	--	--	--
Black walnut	449	412	37	--	--	--	--
Black cherry	62	62	--	--	--	--	--
Elm	468	243	113	80	--	--	32
Other hardwoods	8,764	214	2,160	2,836	--	--	3,554
Total hardwoods	57,838	24,389	13,272	9,887	2,283	--	8,007
All species	65,006	28,976	13,887	11,853	2,283	--	8,007

1/ Cuttings of less than 3 cords per acre or the equivalent in board feet are included.

2/ International 1/4-inch rule.

Table 84.--*Area of managed harvest for 1972-1981*[1] *by harvest cuttings on commercial forest land and by forest type and stand-age class, Missouri*

(In thousand acres)

Forest type	All ages	Stand-age class (years)											
		0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100-119	120-139
Shortleaf pine	20.6	--	--	--	--	--	12.4	8.2	--	--	--	--	--
Eastern redcedar	13.6	--	1.2	--	1.3	--	--	1.8	4.9	4.4	--	--	--
Eastern redcedar-hardwood	39.7	1.1	--	6.4	--	2.7	7.1	7.3	--	2.3	2.7	10.1	--
Shortleaf pine-oak	53.8	--	6.0	--	--	.6	10.2	19.0	14.4	--	3.6	--	--
Post-blackjack oak	493.1	--	--	--	--	--	.5	91.0	113.2	81.3	71.8	85.5	49.8
Black-scarlet oak	711.3	--	--	--	--	--	--	105.2	233.5	113.3	131.9	98.5	28.9
White oak	471.9	--	--	--	--	--	.6	1.1	90.9	59.3	69.4	184.9	65.7
Oak-gum-cypress	26.7	--	--	--	--	2.3	--	.7	4.0	3.0	4.3	7.0	5.4
Elm-ash-cottonwood	121.3	--	--	--	--	--	20.0	28.2	24.8	24.5	14.0	7.7	2.1
Cottonwood	1.6	--	--	1.0	--	.6	--	--	--	--	--	--	--
Maple-beech	31.9	--	--	--	--	--	--	1.2	7.5	1.5	5.5	7.6	8.6
All forest types	1,985.5	1.1	7.2	7.4	1.3	6.2	50.8	263.7	493.2	289.6	303.2	401.3	160.5

1/ For a ten-year period.

Table 85.--*Area of managed harvest for 1972-1981*[1] *by thinnings on commercial forest land and by forest type and stand-age class, Missouri*

(In thousand acres)

Forest type	All ages	Stand-age class (years)							
		0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79
Shortleaf pine	37.8	--	2.4	3.7	14.9	16.8	--	--	--
Eastern redcedar-hardwood	5.7	5.7	--	--	--	--	--	--	--
Shortleaf pine-oak	24.2	--	--	--	10.8	13.4	--	--	--
Black-scarlet oak	747.9	14.5	59.7	95.6	216.1	218.5	136.7	1.9	4.9
White oak	235.3	7.4	8.9	36.8	68.8	46.6	45.2	16.8	4.8
Oak-gum-cypress	44.7	2.0	--	20.3	18.4	4.0	--	--	--
Elm-ash-cottonwood	184.7	3.9	8.0	58.8	65.2	39.2	9.6	--	--
Maple-beech	50.3	--	--	9.5	21.8	7.9	5.8	5.3	--
All forest types	1,330.6	33.5	79.0	224.7	416.0	346.4	197.3	24.0	9.7

1/ For a 10-year period.

Table 86.--*Output of roundwood products by source, and softwoods and hardwoods, Missouri, 1969*

(Thousand cubic feet)

Product and species group	All sources	Growing stock trees[1/]			Rough and rotten trees[1/]	Salvable dead trees[1/]	Other sources[2/]
		Total	Sawtimber	Poletimber			
Industrial products							
Saw logs							
Softwood	3,308	3,306	3,306	--	2	--	--
Hardwood	63,013	45,231	43,689	1,542	17,072	192	518
Total	66,321	48,537	46,995	1,542	17,074	192	518
Veneer logs and bolts							
Softwood	--	--	--	--	--	--	--
Hardwood	1,014	672	672	--	252	--	90
Total	1,014	672	672	--	252	--	90
Pulpwood							
Softwood	--	--	--	--	--	--	--
Hardwood	1,892	1,262	1,197	65	306	1	323
Total	1,892	1,262	1,197	65	306	1	323
Miscellaneous industrial products							
Cooperage							
Softwood	--	--	--	--	--	--	--
Hardwood	8,845	8,009	7,968	41	814	--	22
Total	8,845	8,009	7,968	41	814	--	22
Piling							
Softwood	--	--	--	--	--	--	--
Hardwood	--	--	--	--	--	--	--
Total	--	--	--	--	--	--	--
Poles							
Softwood	265	265	89	176	--	--	--
Hardwood	2	2	--	2	--	--	--
Total	267	267	89	178	--	--	--
Mine timbers (round)							
Softwood	--	--	--	--	--	--	--
Hardwood	128	96	14	82	11	--	21
Total	128	96	14	82	11	--	21
Posts (round and split)							
Softwood	1,152	786	235	551	3	62	301
Hardwood	1,348	976	698	278	177	4	191
Total	2,500	1,762	933	829	180	66	492
Other							
Softwood	338	338	307	31	--	--	--
Hardwood	17,788	6,405	2,903	3,502	9,342	36	2,005
Total	18,126	6,743	3,210	3,533	9,342	36	2,005
All miscellaneous industrial products							
Softwood	1,755	1,389	631	758	3	62	301
Hardwood	28,111	15,488	11,583	3,905	10,344	40	2,239
Total	29,866	16,877	12,214	4,663	10,347	102	2,540
All industrial products							
Softwood	5,063	4,695	3,937	758	5	62	301
Hardwood	94,030	62,653	57,141	5,512	27,974	233	3,170
Total	99,093	67,348	61,078	6,270	27,979	295	3,471
Fuelwood							
Softwood	102	37	18	19	17	18	30
Hardwood	24,351	7,745	3,683	4,062	3,417	3,913	9,276
Total	24,453	7,782	3,701	4,081	3,434	3,931	9,306
All products							
Softwood	5,165	4,732	3,955	777	22	80	331
Hardwood	118,381	70,398	60,824	9,574	31,391	4,146	12,446
Total	123,546	75,130	64,779	10,351	31,413	4,226	12,777

1/ On commercial forest land.

2/ Includes trees less than 5.0 inches in diameter, tree tops and limbs from commercial forest areas or material from noncommercial forest land or nonforest land such as fence rows or suburban areas.

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MISSOURI
MAJOR FOREST TYPES, 1972

- NONFOREST
- OAK - HICKORY
- ELM - ASH - COTTONWOOD
- OAK - GUM - CYPRESS
- PINE AND OAK - PINE
- RESERVIOR

Spencer, John S., Jr., and Burton L. Essex.
1976. Timber in Missouri, 1972. USDA For. Serv. Resour. Bull. NC-30, 107 p., illus. North Cent. For. Exp. Stn., St. Paul, Minn.

The third inventory of Missouri's timber resource shows a small gain in growing-stock volume and a somewhat larger gain in sawtimber volume since 1959. Area of commercial forest declined sharply between surveys. Presented are text and statistics on forest area and timber volume, growth, mortality, ownership, stocking, future timber supply, and forest management opportunities.

OXFORD: 524.1:905.2(778). KEY WORDS: timber volume, growth, utilization, forest areas.

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Some Recent Forest Survey Reports Published by
the North Central Forest Experiment Station

Timber volume in Missouri counties, by Arnold J. Ostrom. USDA For. Serv. Res. Note NC-179, 4 p., 1974.

Forest area in Missouri counties, 1972, by Burton L. Essex. USDA For. Serv. Res. Note NC-182, 4 p., 1974.

Timber resource of Missouri's Eastern Ozarks, 1972, by Burton L. Essex and John S. Spencer, Jr. USDA For. Serv. Resour. Bull. NC-19, 62 p., 1974.

Timber resource of Missouri's Southwestern Ozarks, 1972, by Arnold J. Ostrom and Jerold T. Hahn. USDA For. Serv. Resour. Bull. NC-21, 60 p., 1974.

Timber resource of Missouri's Northwestern Ozarks, 1972, by Alexander Vasilevsky and Burton L. Essex. USDA For. Serv. Resour. Bull. NC-22, 59 p., 1974.

Timber resource of Missouri's Riverborder, 1972, by John S. Spencer, Jr. and Arnold J. Ostrom. USDA For. Serv. Resour. Bull. NC-25, 74 p., 1975.

Timber resource of Missouri's Prairie, 1972, by Jerold T. Hahn and Alexander Vasilevsky. USDA For. Serv. Resour. Bull. NC-26, 100 p., 1975.

Forest area in Iowa counties, 1974, by Burton L. Essex. USDA For. Serv. Res. Note NC-195, 4 p., 1975.

Pulpwood production in the Lake States by county, 1974, by James E. Blyth and Jerold T. Hahn. USDA For. Serv. Res. Note NC-193, 4 p., 1975.

Pulpwood production in the North Central Region by county, 1973, by James E. Blyth. USDA For. Serv. Resour. Bull. NC-27, 16 p., 1975.

Primary forest products industry and timber use, Iowa, 1972, by James E. Blyth and William A. Farris. USDA For. Serv. Resour. Bull. NC-28, 20 p., 1975.

A local net volume equation for Iowa, by Jerold T. Hahn. USDA For. Serv. Res. Note NC-199, 4 p., 1976.